Coal Age

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JANUARY, 1947

Volume 52 — *Number 1*

CHANGE OF ADDRESS

Director of Circulation, COAL AGE
330 West 42nd St., New York 18, N. Y.

Please change the address of my COAL AGE subscription as follows:

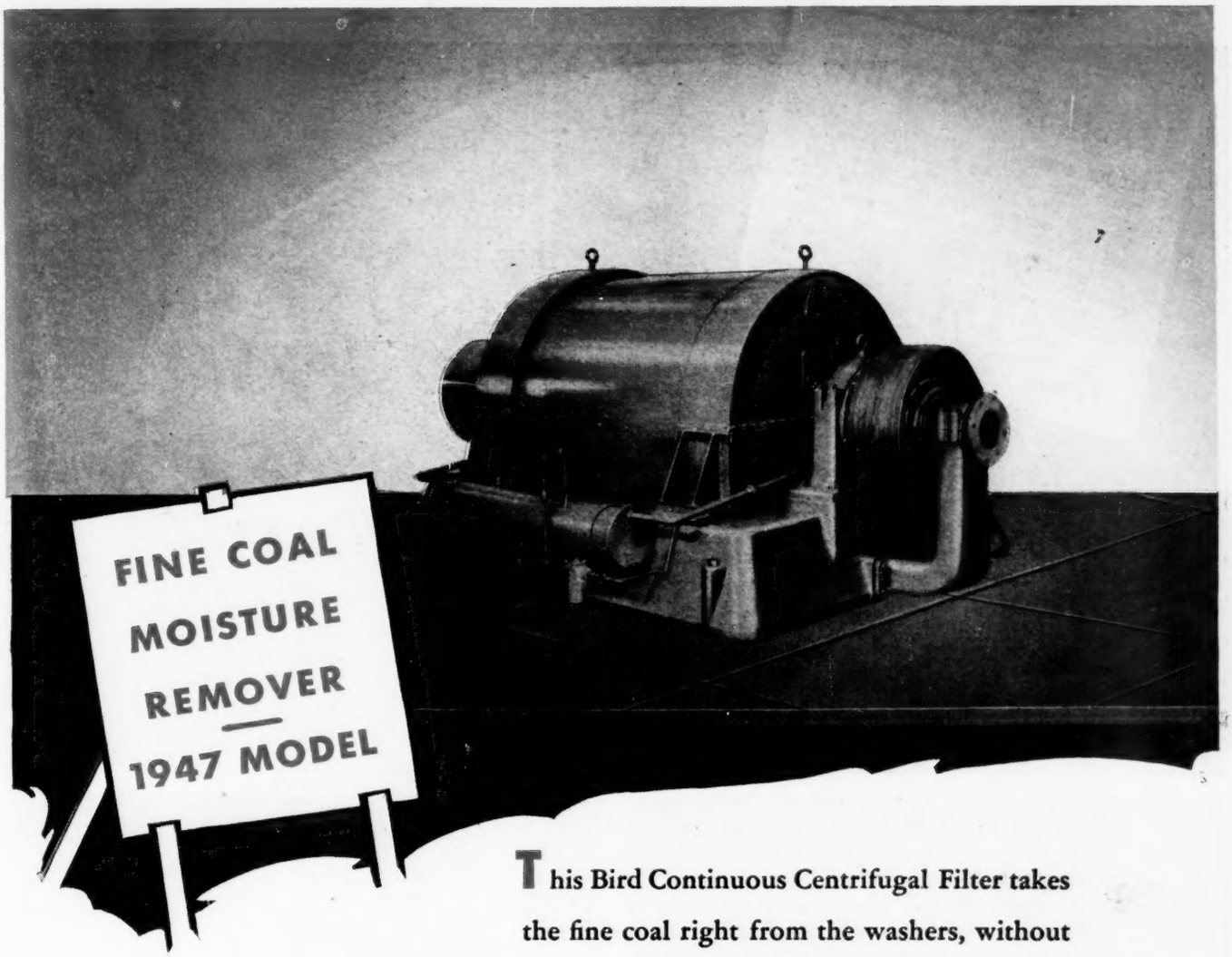
Name .....

Old Address .....

New Address .....

New Company Connection .....

New Title or Position .....



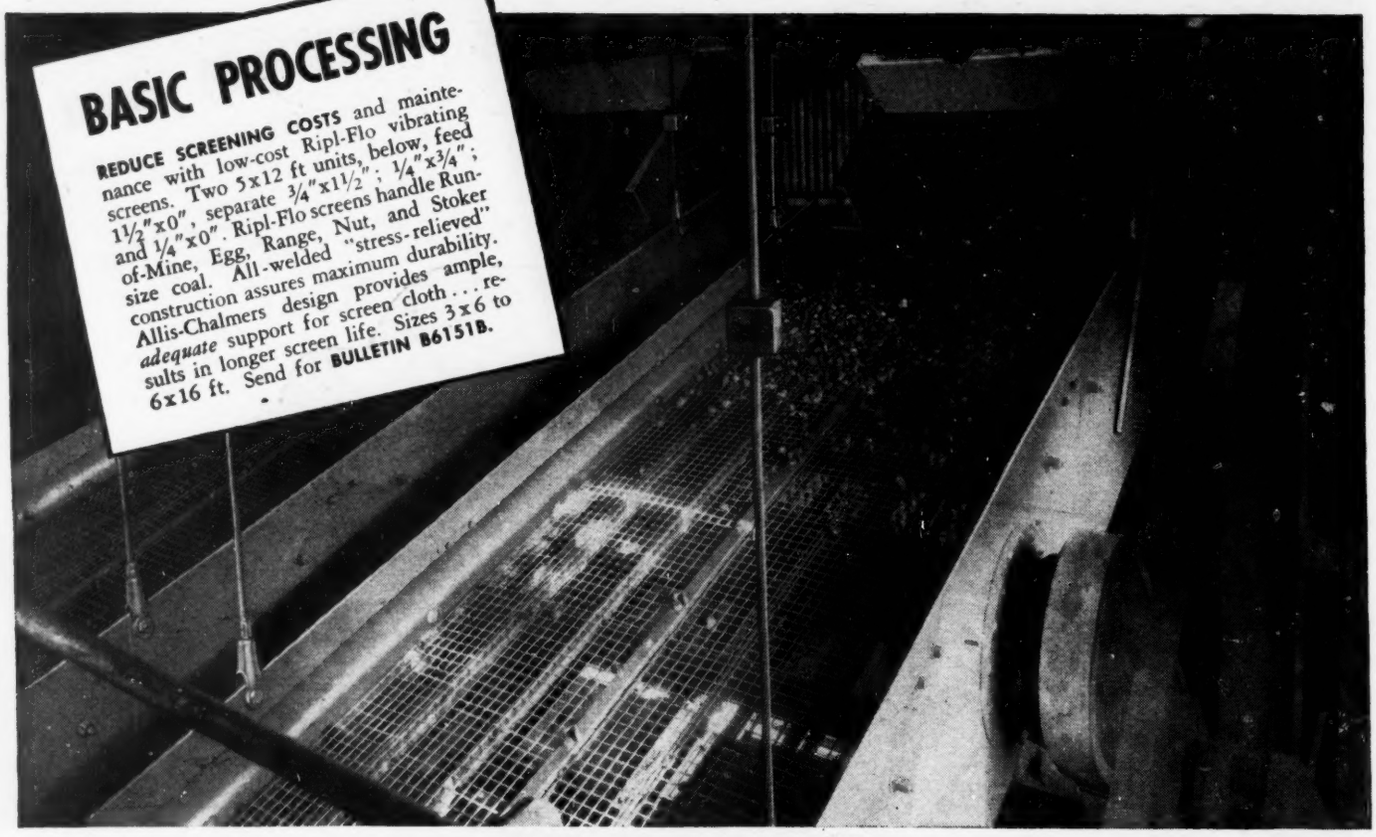
This Bird Continuous Centrifugal Filter takes the fine coal right from the washers, without pre-screening, and delivers it dry and whole —ready for blending with the larger sizes. The water may be returned for re-use.

A minus ¼ plus 0 feed containing 6 to 8% minus 200 mesh fines is discharged with not more than 5% surface moisture.

The Bird handles 40 tons or more of fines per hour, operating steadily for months without a shutdown for parts replacements or repairs of any kind. It does the job in small space at exceedingly low cost.

Ask us to show you how nicely this Bird Filter fits into your preparation system. *Bird Machine Company, South Walpole, Massachusetts.*

The BIRD Centrifugal FILTER

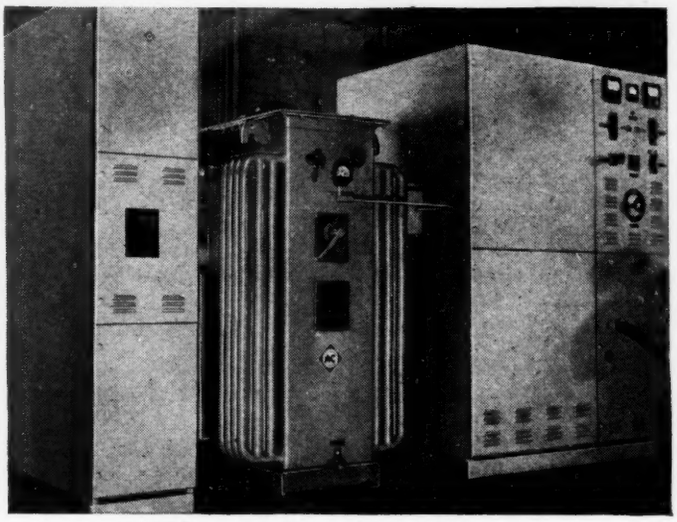


BASIC PROCESSING

REDUCE SCREENING COSTS and maintenance with low-cost Ripl-Flo vibrating screens. Two 5x12 ft units, below, feed 1½"x0", separate ¾"x1½"; ¼"x¾"; and ¼"x0". Ripl-Flo screens handle Run-of-Mine, Egg, Range, Nut, and Stoker size coal. All-welded "stress-relieved" construction assures maximum durability. Allis-Chalmers design provides ample, *adequate* support for screen cloth . . . results in longer screen life. Sizes 3x6 to 6x16 ft. Send for **BULLETIN B6151B.**

POWER TRANSMISSION

MORE CLOSELY COORDINATED PRODUCTION and greatly increased flexibility of equipment can be obtained with the Vari-Pitch Speed-changer, shown installed in coal tipple, above. The turn of a hand wheel controls conveyor or equipment speeds *without stopping the machine!* Widely used in coal preparation plants, the Allis-Chalmers Speed-changer is a proven power-saver . . . space-saver . . . time-saver. Speed changes up to 375% can be made. Thirteen sizes, for applications from 1 to 75 hp. **BULLETIN B6013A.**



POWER DISTRIBUTION

POWER CONVERSION FOR MINE HAULAGE is provided by Allis-Chalmers Excitron rectifiers of the continuously excited, sealed tube type. Excitron rectifiers are applicable for all d-c voltage requirements above 250 volts. High overall conversion efficiency is maintained over the entire load range . . . high power factor is practically constant under all variable load conditions. Allis-Chalmers design improvements make these units immune to disturbances in a-c system and short circuits. Built for long life. **BULLETIN B6301.**

ALLIS-CHALMERS

One of the Big 3 in Electric Power Equipment — Biggest of All in Range of Industrial Products

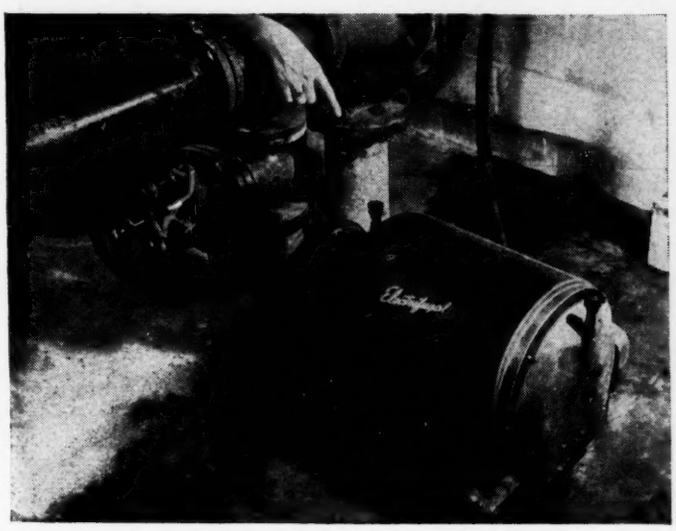
Planning Preparation Plant Improvements?

★ ★

COAL PREPARATION PLANT and tipple men are taking a close look at equipment problems these days. Inevitably, the years just ahead will bring increased mechanization in coal . . . for only through the increased operating economies of better equipment can coal operators be sure of a sound competitive position in tomorrow's markets.

That's why equipment needs for tomorrow's operations must be appraised realistically today. And that's where Allis-Chalmers can be of invaluable help to you. Allis-Chalmers is an "industry-conscious" organization . . . employs specialized engineers whose job is to study coal processing methods and equipment from a *cost-cutting, tonnage increasing* point of view. These specialists guide in the selection of your equipment and help develop new, improved processing equipment.

There's no substitute for Allis-Chalmers' long experience in building coal processing and power equipment . . . no substitute, either, for the fact that Allis-Chalmers builds this equipment in a maximum range of types and sizes. Experience has shown that *maximum efficiency and economy can be obtained in no other way!* Contact the A-C representative nearest you. ALLIS-CHALMERS, MILWAUKEE 1, WISCONSIN.



CENTRIFUGAL PUMPS

THIS COMPACT 4x3 ELECTRIFUGAL Pump recirculates water from settling pond back to dewatering screens in coal tipple. Both pump and motor are combined in one compact unit . . . rotor and pump runner are on a single shaft. The Electrifugal Pump takes up one-third less space than comparable pumps, and operates in *any* position. Maintenance is easy because all parts are easy to get at . . . reducing down time. Splash-proof construction. Single or double stage; single suction. Capacities to 2800 gpm; heads to 300 ft. **B6018.**

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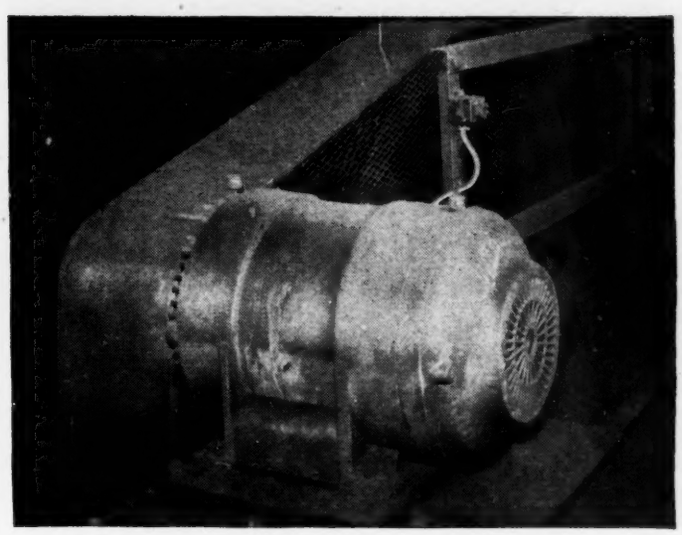


MOTORS AND DRIVES

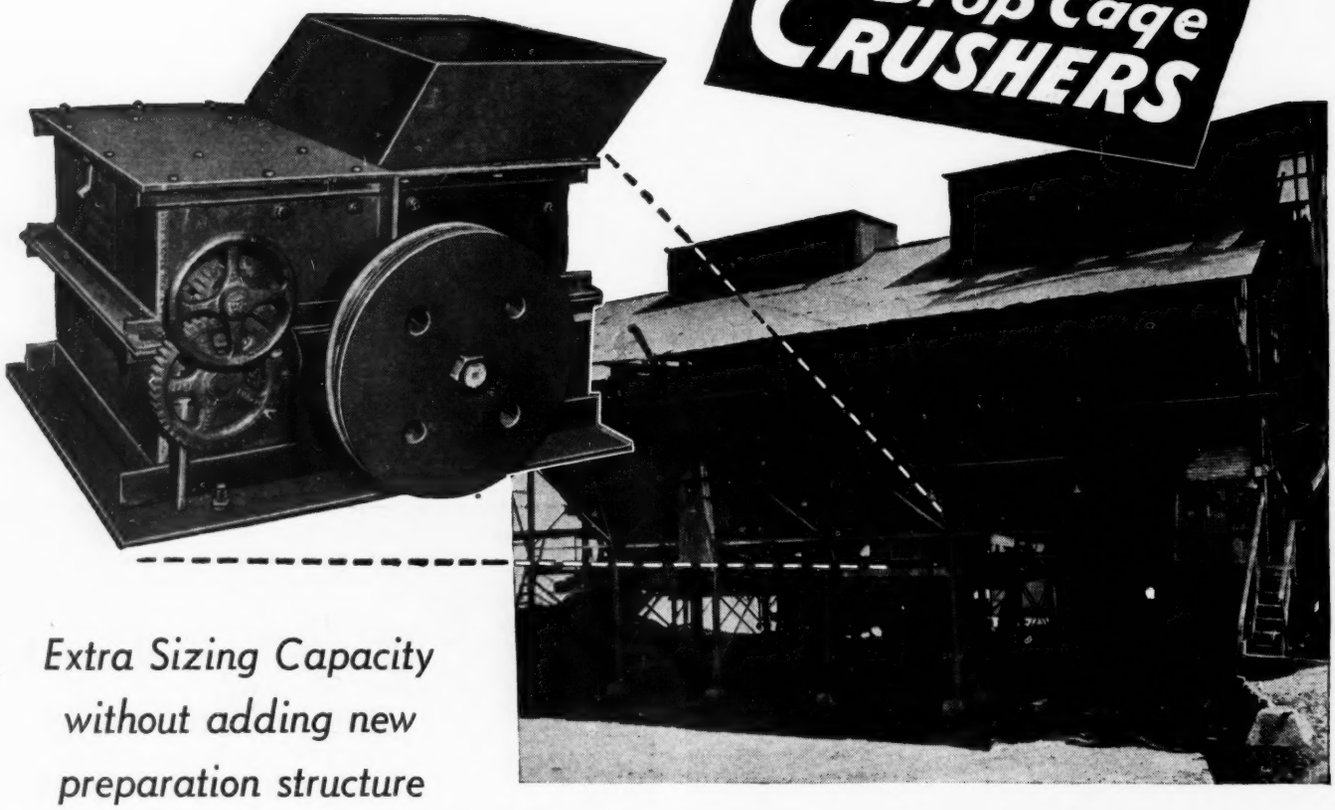
GET DEPENDABLE, TROUBLE-FREE POWER with Allis-Chalmers' complete line of motors and drives. Above is shown a 25 hp Type ARZ totally-enclosed fan-cooled Allis-Chalmers motor and Texrope V-belt drive installed in a coal tipple. Dusty, gritty location does not harm motor . . . cooling air is circulated without touching interior windings. Texrope V-belt drives afford maximum resistance to wear because belt covers are double ply and made of tough, rubberized fabrics cut on a bias. Send for **BULLETIN B6051F** and **B6052F.**

1847 1947
A CENTURY OF SERVICE
to Industry
THAT MADE
America Great

. . . builds for COAL

MARKETING FLEXIBILITY *added without extensive plant alterations*

with **AMERICAN Drop Cage CRUSHERS**



Extra Sizing Capacity without adding new preparation structure

Mine preparation plants and service facilities frequently are confronted with market demands beyond their capacities. These installations have been erected without due regard to changing conditions. As a consequence they have limited flexibility in meeting new situations or increased demands excepting through excessive conversion expense.

Such a problem was encountered by the Perry Coal Company at its St. Ellen Mine, near O'Fallon, Illinois. In this instance, the problem was handled by the installation of an American Drop-Cage Crusher strategically placed under its nut coal bin. With such a location the coal either may be fed by gravity direct from the bin to the crusher and converted into 3/4 inch screening for truck loading, or it may be loaded from the bin into trucks by-passing the crusher.

Through this arrangement an additional size of coal is available for customers' requirements with substantial storage capacity enabling the company to give its usual prompt service. This installation has added new flexibility to the plant without extensive plant revision, without disrupting production and at a minimum cost.

Can your plant benefit and increase its flexibility with such an installation?

Write for details on the American Drop-Cage Crusher

American PULVERIZER COMPANY

Originators and Manufacturers of Ring Crushers and Pulverizers

1119 MACKLIND AVE.
ST. LOUIS 10, MO.

NEW

Built to shoulder

TWO TOUGH JOBS

HERE'S your new and different work tire—a double-duty husky that operates off *and* on the road like a hard-working Hercules.

It's the new Goodyear Road Lug—tougher and stronger than any regular prewar truck tire because it's fortified in both tread and body to stand up and take brutal, heavy-duty service OFF the road, and deliver low-cost mileage ON the highway.

Designed for logging, coal and building supply delivery, construction and similar operations, this great hauler does the double job of going off the road for heavy loads and taking them over the highway. It's bodied with tough, heat-resisting rayon cord for super strength and bruise resistance. And its extra-heavy tread, providing maximum resistance to cutting and snagging, has alternate long and short bars so it can dig in for traction and still ride the highway.

If your needs call for tire brawn to deliver such double-duty service, Goodyear's new Road Lug is for you. It will give you new standards in performance, and another big reason why "*more tons are hauled on Goodyear truck tires than on any other kind.*"

Road Lug—T.M. The Goodyear Tire & Rubber Company

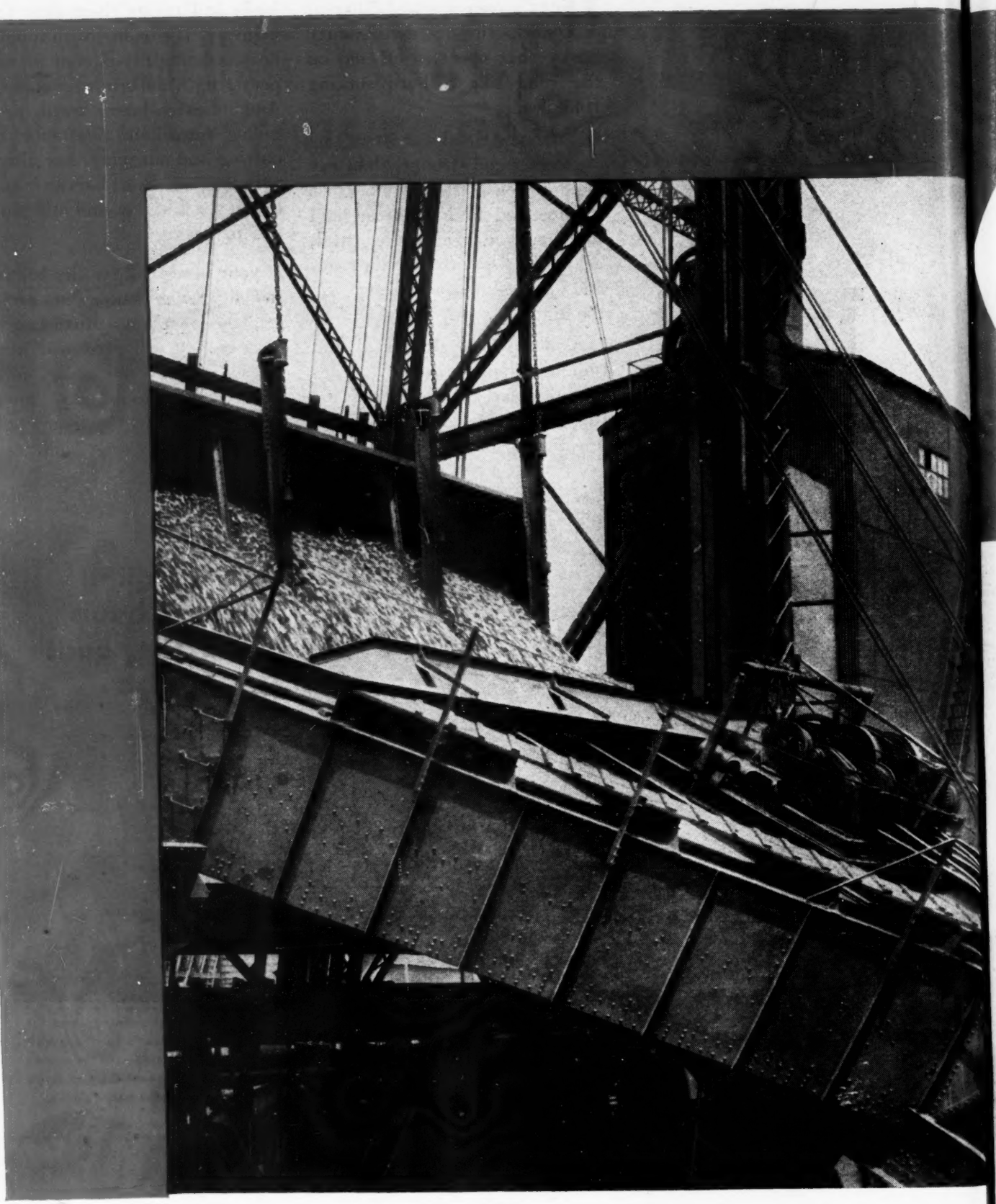
GOODYEAR

ROAD LUG TIRE

BUY and SPECIFY

GOODYEAR

—it pays!



Tune in . . .
TEXACO STAR THEATRE
presents the NEW
EDDIE BRACKEN SHOW
every Sunday night.
Metropolitan Opera broadcasts Saturday afternoons.

TEXACO

ASSURED PROTECTION FOR BOTH ROPE AND GEARS

WIRE ROPE and open gears . . . on stripping shovels, hoists and other mine equipment . . . will last longer and serve you better when you keep them lubricated with *Texaco Crater*. This statement is borne out by the experience of operators everywhere for more than 30 years.

On wire rope, *Crater "A"* gives long-lasting protection inside and out. It maintains an effective barrier against moisture, corrosion and dirt . . . lubricates the strands against friction . . . keeps rope flexible, strong and easy to handle. *Crater "A"* penetrates . . . preserves the core . . . materially reduces wear.

On open gears, *Crater's* tough, clinging film cushions load shocks, quiets noise and prevents metal-to-metal wear.

Texaco Products and Lubrication Engineering Service are available everywhere. Call the nearest of the more than 2300 Texaco distributing plants in the 48 States, or write The Texas Company, *National Sales Division, Dept. C*, 135 East 42nd Street, New York 17, N. Y.

TEXACO MAINTENANCE LUBRICATION CHARTS. Leading manufacturers of underground coal mining machinery approve Texaco products for use on cutters, loaders, locomotives, etc., and have cooperated in preparing these charts. Charts show clearly where and when to use the proper Texaco lubricants. Order the charts you need by make and model of each machine.

Lubricants

FOR THE COAL MINING INDUSTRY

CONFIDENCE...

Manufacturers of Wire Rope and Strand • Fittings • Slings • Screen, Hardware and Industrial Wire Cloth • Aerial Wire Rope Systems
Hard, Annealed or Tempered High and Low Carbon Fine and Specialty Wire, Flat Wire, Cold Rolled Strip and Cold Rolled Spring Steel • Ski Lifts

. . . . how much is it worth?

IN 1841, two years before the first telegraph line was installed in this country, and when there were but 27 states in the Union, John August Roebling was inspired with the idea of making a new kind of rope of unheard of strength and flexibility. His confidence in his idea caused him to risk everything he had on the development of his new rope.

How much is his confidence worth to Industry today, which couldn't turn a wheel without the modern wire rope?

Today, the John A. Roebling's Sons Company invests much time, effort and money in the development of improved products to keep alive the confidence of its many customers.

Roebling values this confidence as its greatest asset. That's why it offers you the greatest value for every dollar you invest . . . in *any* Roebling product.

HOW TO SAVE WIRE ROPE DOLLARS

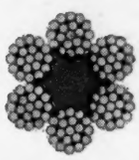
Wire rope is a machine of many parts and, like any machine, even the finest of wire ropes can be destroyed quickly through faulty installation or improper maintenance. To insure against this possibility, Roebling established its Field Engineering Service.

Every Roebling Field Engineer has a thorough knowledge of wire rope . . . its types, its uses, its features and limitations. This knowledge plus the experience he gains in his daily contacts can be a great asset to you . . . helping you solve those tough wire rope problems . . . giving you more service for each wire rope dollar.

Get to know your Roebling Field Engineer. Call him at your nearby Roebling Branch Office.

JOHN A. ROEBLING'S SONS COMPANY
TRENTON 2, NEW JERSEY
Branches and Warehouses in Principal Cities

FOR EXAMPLE—"BLUE CENTER" STEEL WIRE ROPE

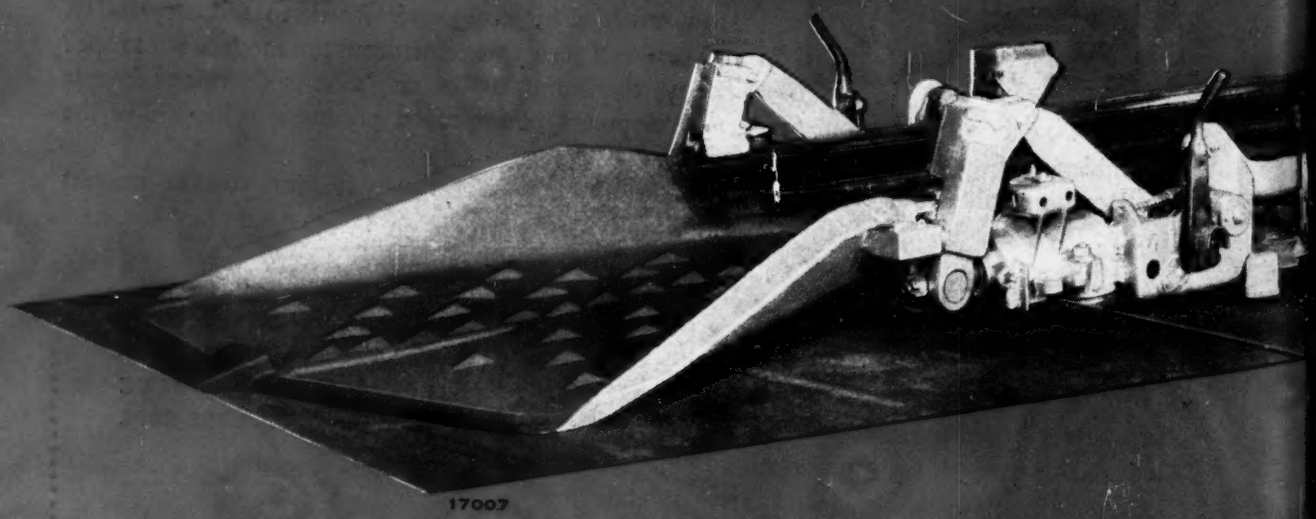


Roebling entrusts your confidence in Roebling and Roebling products to the performance of its "Blue Center" Steel Wire Rope. It is the best rope Roebling knows how to make. It is available as preformed or non-preformed, in a complete range of sizes and constructions to meet a great variety of operating conditions. Its uses are almost unlimited and its performance is consistently economical.

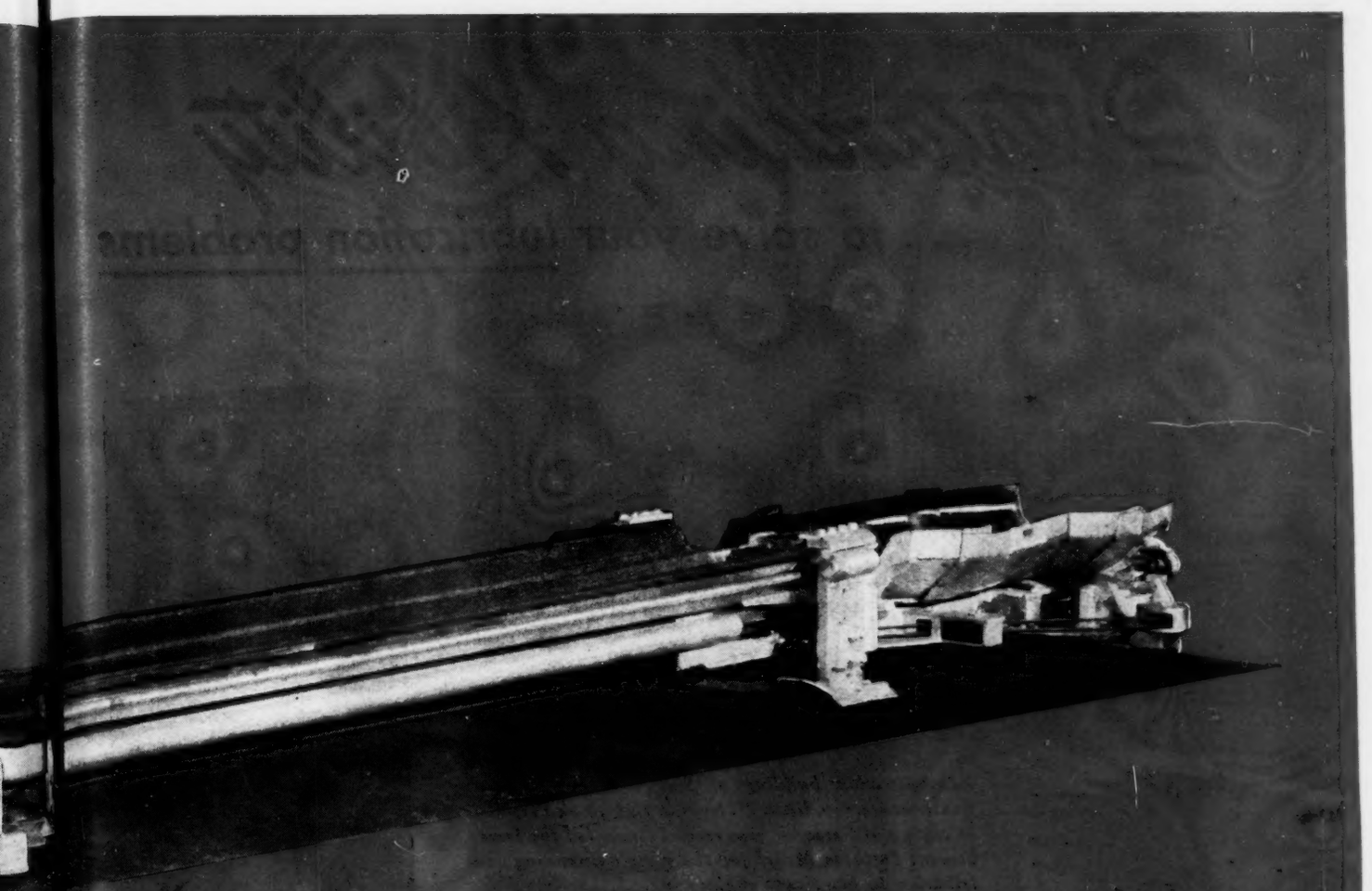
Electrical Wire and Cable • Suspension Bridges and Cables
Aircord, Aircord Terminals and Air Controls • Lawn Mowers

ROEBLING

A CENTURY OF CONFIDENCE



GOODMAN MANUFACTURING COMPANY



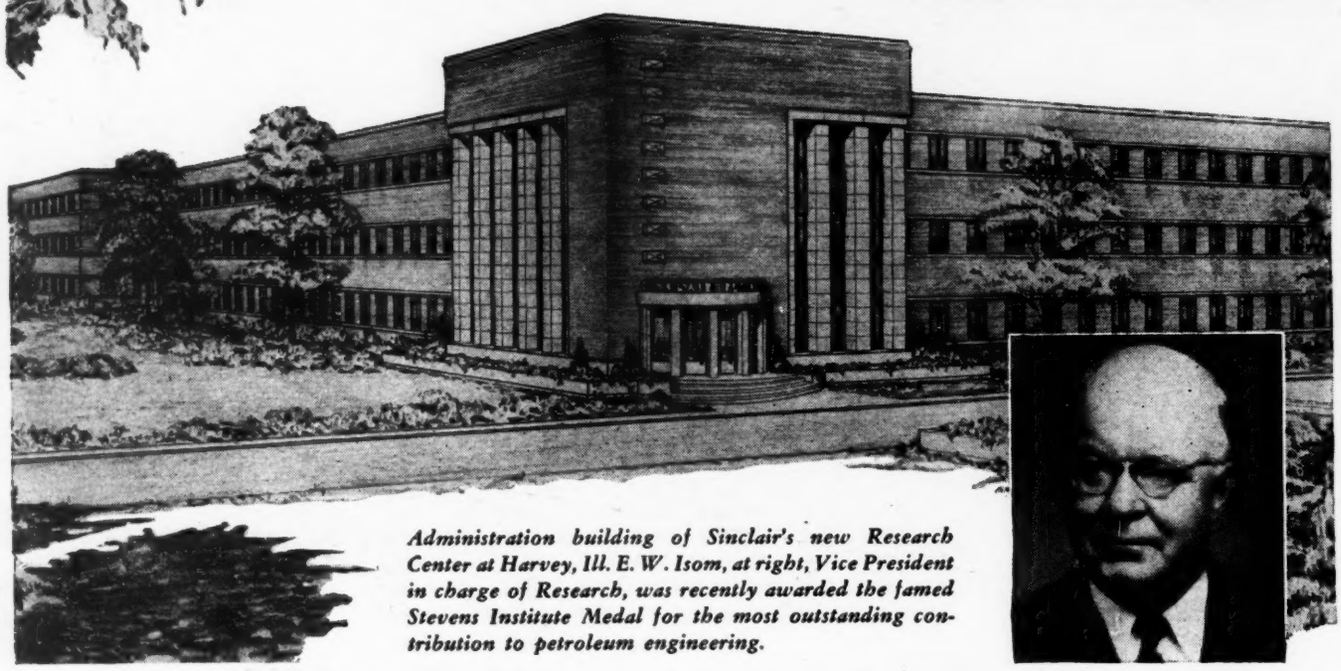
THE GOODMAN POWER DUCKBILL

All movements power controlled

HALSTED STREET AT 48TH • CHICAGO 9, ILLINOIS

Outstanding Ability

. . . to solve your lubrication problems



Administration building of Sinclair's new Research Center at Harvey, Ill. E. W. Isom, at right, Vice President in charge of Research, was recently awarded the famed Stevens Institute Medal for the most outstanding contribution to petroleum engineering.

Sinclair is completing a new $4,000,000 petroleum research and development laboratory at Harvey, Ill. This great research center — to be the most modern and best equipped in the industry — climaxes more than 30 years of consistent achievement in the development of superior products for the solution of your most difficult lubrication problems.

The outstanding skill and vast technical knowledge of recognized experts in the petroleum field will continue to serve you at Harvey as they have for so many years at East Chicago.

For tested, proven lubricants . . . *designed by special research for specific industrial application* . . . rely on *Research-Wise Sinclair.*

Sinclair Automotive Lubricants for Strip Mining

For Engines:
OPALINE MOTOR OIL
OPALINE TBT MOTOR OIL
(For severe service)
TENOL (Heavy Duty — For Diesels)
For Gears:
OPALINE GEAR LUBRICANTS
For Chassis:
OPALINE CHASSIS LUBRICANT
For Wheel Bearings:
SINCOLUBE

SINCLAIR REFINING COMPANY • 630 FIFTH AVENUE, NEW YORK 20, N. Y.

SINCLAIR

Lubricants for Industry

FINEST CRUDES + EXPERT RESEARCH and MANUFACTURING CONTROL = OUTSTANDING PERFORMANCE

Bethlehem's No. 5 steel tie will bear the full weight of your heavy motors, cutters, and loaders. Built to take abuse, it embodies a quarter-century's experience in the manufacture of steel mine ties — millions of them.

HEAVIER STEEL TIES

MEAN MORE VALUE PER DOLLAR

Today the demand for heavier steel mine ties is greatly on the increase, spurred by the use of modern, highly-mechanized equipment.

This bears out what we have said for a long time: under present conditions the heavier ties give *greater value per dollar*—better and longer service —than lightweight ties.

A Bethlehem No. 5, for instance, weighs 5 lb per ft of section. It is built specifically for the popular 40-lb rail so widely used with heavy track-mounted equipment. Yes, its initial cost is higher than that of a No. 2 or a No. 3. But it will last so much longer that its purchase is economy in the end.

It is not at all uncommon for a Bethlehem No. 5 to be taken up and reused 25 times or more. Ask for full details.

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

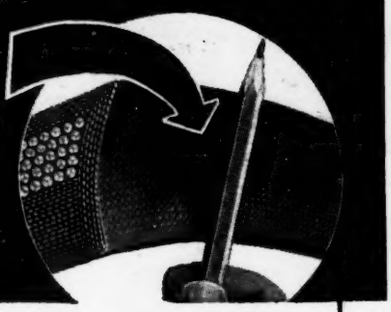
On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation

In *ANY* V-Belt It's the *SIDES* That Get the *WEAR!*

The moment you look at a V-Belt in its sheave you see at once that the *sides* of the belt do all the gripping on the pulley and get all the wear against the sheave-groove wall.

Notice, too—it's the *sides* that pick up all the power delivered by the driver pulley. The sides *transmit* that power to the *belt as a whole.* And then, once more, it's the sides—and the sides *alone*—that grip the driven pulley and *deliver* the power to it.

That's Why The FACT That the CONCAVE SIDE (A GATES PATENT) *REDUCES* Sidewall *WEAR* Is IMPORTANT to You!



The fact that the *side* is the part that does the work and gets the wear explains why you have always noticed that the sidewall of the *ordinary* V-Belt is the part that wears out *first.* Naturally, then, when you lengthen the life of the sidewall you lengthen the life of the belt.

The simple diagrams on the right show exactly why the ordinary, *straight-sided* V-Belt gets excessive wear along the *middle of the sides.* They show also why the Patented Concave Side *greatly reduces* sidewall wear in Gates Vulco Ropes. That is the simple reason why your Gates Vulco Ropes are giving you so much longer service than any straight-sided V-Belts can possibly give.

Longer Sidewall Wear Is NOW MORE IMPORTANT Than Ever Before!

Now that Gates Specialized Research has resulted in V-Belts having much stronger tension members—tension members of Rayon Cords and Flexible Steel Cables, among others—the sidewall of the belt is often called upon to transmit to the pulley much heavier loads. Naturally, with heavier loading on the sidewall the life-prolonging Concave Side is more important today than ever before!

THE GATES RUBBER COMPANY, DENVER, U. S. A.
World's Largest Makers of V-Belts

Straight Sided V-Belt

How Straight Sided V-Belt Bulges When Bending Around Its Pulley

You can actually feel the bulging of a straight-sided V-Belt by holding the sides between your finger and thumb and then bending the belt. Naturally, this bulging produces excessive wear along the middle of the sidewall as indicated by arrows.

Gates V-Belt with Patented Concave Sidewall

Showing How Concave Side of Gates V-Belt Straightens to Make Perfect Fit in Sheave Groove When Belt Is Bending Over Pulley

No Bulging against the sides of the sheave groove means that sidewall wear is evenly distributed over the full width of the sidewall—and that means much longer life for the belt!

471

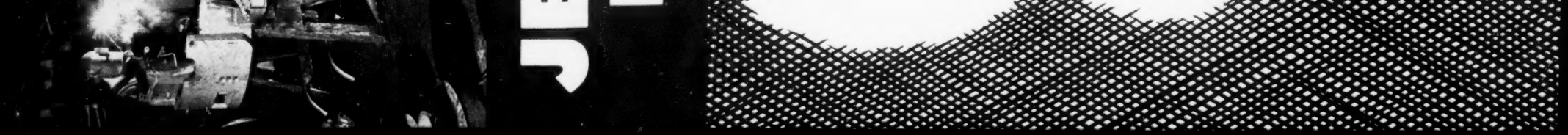
GATES VULCO ROPE DRIVES

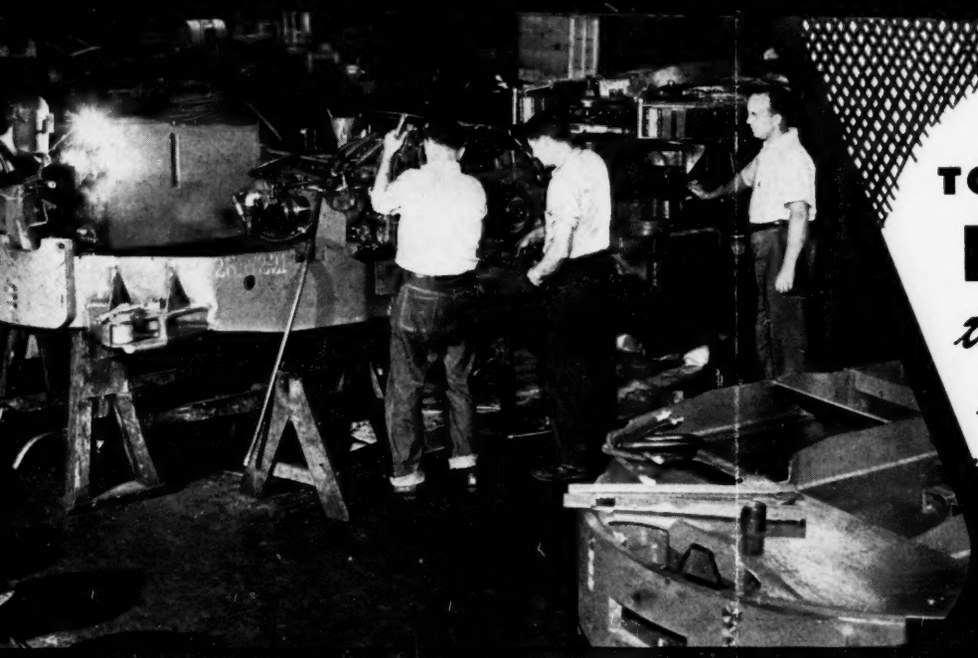
Engineering Offices and Jobber Stocks **IN ALL INDUSTRIAL CENTERS** of the U. S. and 71 Foreign Countries

Gates
REG. U. S. PAT. OFF.
THE MARK OF SPECIALIZED RESEARCH


JM
We show a Jeffrey 20-ton
Locomotive pulling a full tra
at a large property in Penn
Send for our Locomotive Ca
.235-40

5-40





TO PERFORM
RIGHT
they must be built right

JEFFREY *main line* LOCOMOTIVES

● Shown here are two steps in the assembly of Jeffrey Locomotives. These men hold in their hands the service records of equipment in the making . . . equipment that has not yet hit the rails.

In short, the mechanical knowledge, skill and careful workmanship built into these locomotives by Jeffrey employees are reflected in the service records of this equipment in actual service.

We salute them for the job they are doing, and are proud of the service Jeffrey equipment is rendering operators in all coal-producing areas.

PERFORM
RIGHT
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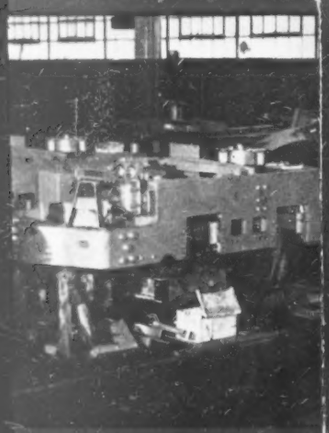
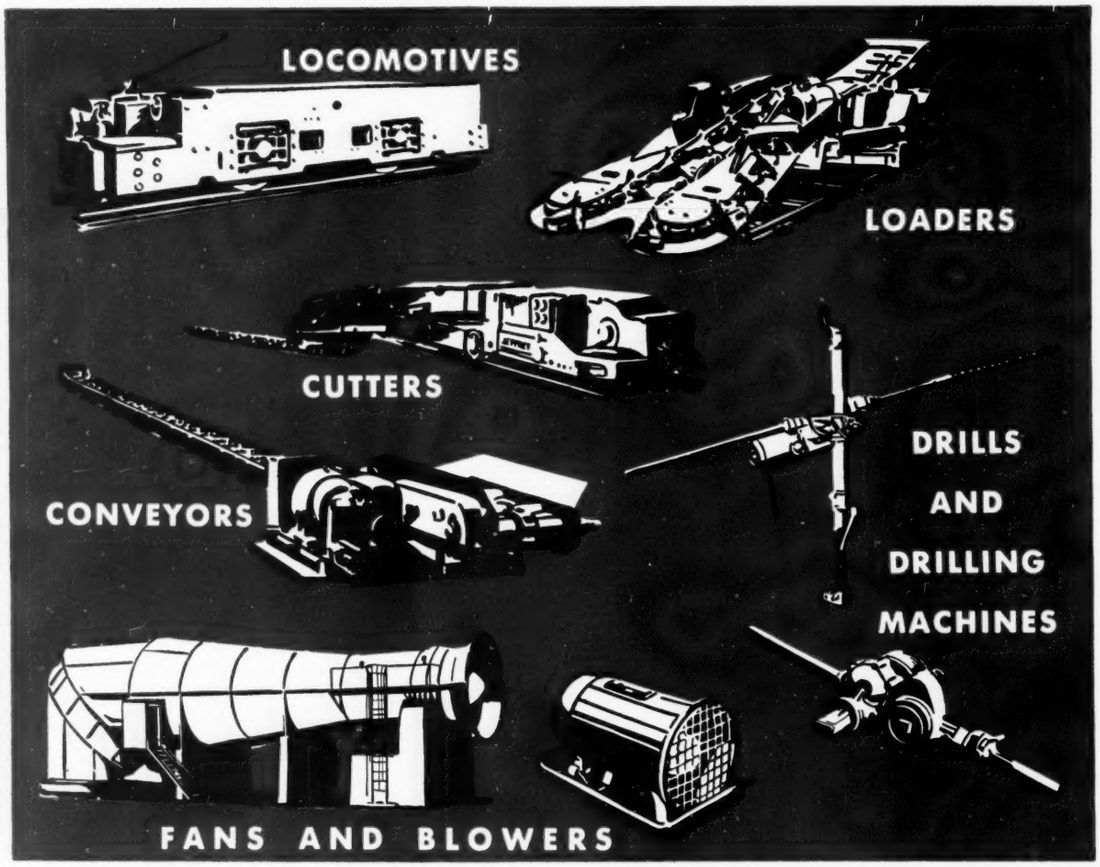


Jeffrey
EQUIPMENT FOR COAL MINES

JEFFREY SERVICE TO THE COAL MINES MEANS SERVICE TO ALL INDUSTRY



THE JEFFREY MANUFACTURING COMPANY

Established in 1877

912-99 NORTH FOURTH STREET, COLUMBUS 16, OHIO

Sales Offices:	Baltimore Birmingham Boston Buffalo	Chicago Cleveland Cincinnati Detroit	Denver Harlan Houston Huntington	Milwaukee New York Philadelphia Pittsburgh	Scranton St. Louis Salt Lake City
Service Stations:	Pittsburgh Harlan, Ky.	Birmingham St. Louis	Logan-Beckley W. Va.	Scranton	
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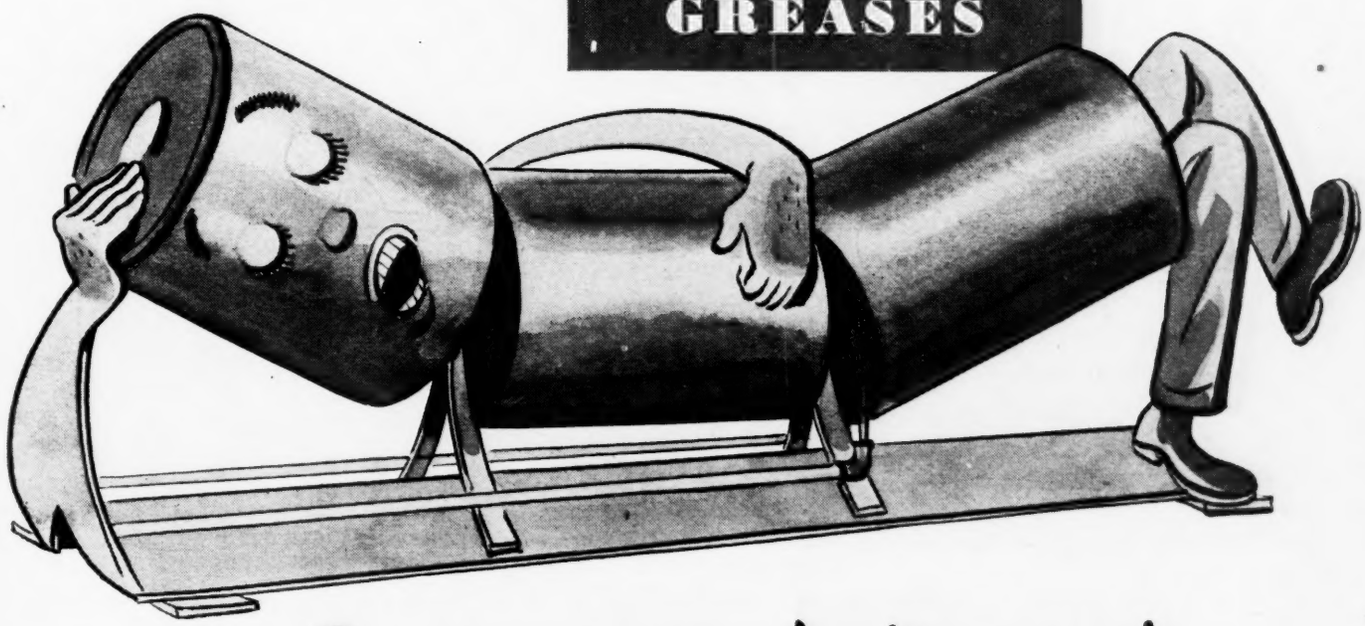
Wake up idle idlers with

SUPERLA GREASES



... Save power, belts, and coal-handling costs on conveyors

ARE CONVEYOR IDLERS slow to start up in cold weather? Do they heat up, throw off grease, and run dry when the weather's hot?

A change to a better lubricant may make these lazy idlers carry their share of the load — and, incidentally, save on power, belt wear, and coal-handling time.

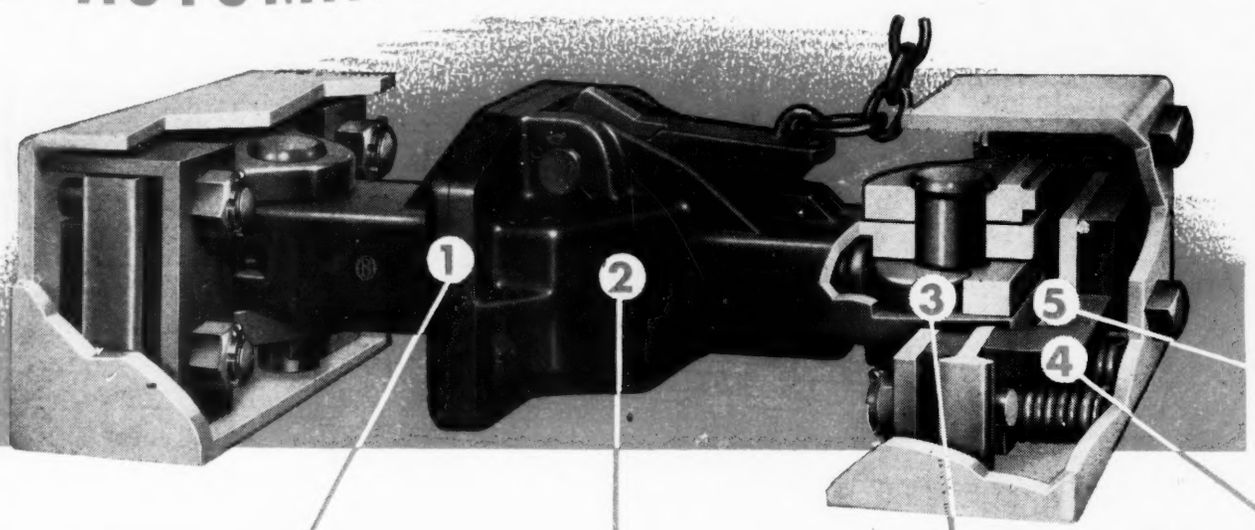
Superla Greases are ideal for idlers. Grades are available that permit idlers to turn readily at low temperatures. Yet these lubricants do not thin out or separate when normal operating temperatures are reached. Where temperatures are above normal (over 175° F), Superla X Greases resist separation and oxidation, and have good sealing quality.

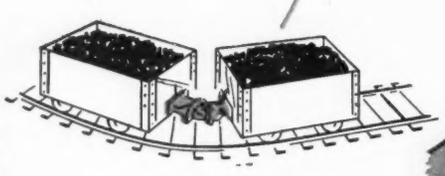
A Standard Oil Lubrication Engineer will gladly help you make a test. Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.

STANDARD OIL COMPANY (INDIANA) STANDARD SERVICE

5 Reasons Why

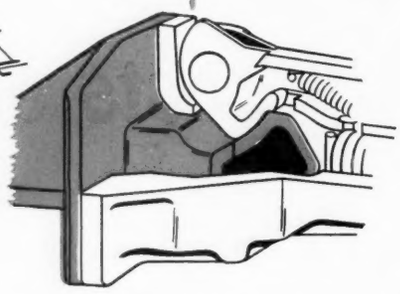
O-B AUTOMATIC COUPLERS GIVE YOU





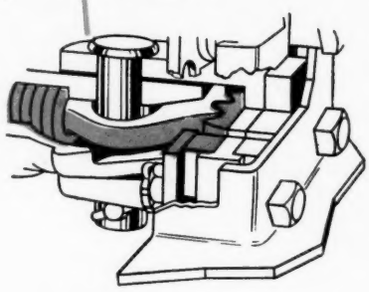
EXTRA-WIDE GATHERING RANGE

With O-B's male-and-female type coupler heads, maximum gathering range is provided. Depending upon the car construction and its relation to the track, O-B Coupler-equipped cars will operate over and automatically couple upon curves of minimum radius.



POSITIVE INTERLOCK

Once coupled, O-B Automatic Couplers stay coupled. There's no chance of accidental disengagement or inter-coupler movement. A moveable cam on the female head fits snugly into a corresponding notch on the male head. The harder you try to pull the heads apart, the tighter the cam fits into the notch.



AUTOMATIC SELF-CENTERING

There's no need to align O-B Coupler heads manually before coupling — a self-contained centering arrangement automatically keeps the heads in center-to-center alignment. An important safety feature, automatic self-centering keeps your workmen out of the danger zone between two mine cars.

MORE FOR YOUR EQUIPMENT DOLLAR

O-B Automatic Mine Car Couplers bear little resemblance to railroad couplers — and for very good reasons! Mine haulage conditions are different. Shorter curves and more frequent operation on curves make extra-wide gathering range a necessity. Cars must be made to operate over sharp breaks in grades at dips and knuckles. Impact blows from surging are proportionately more severe requiring a draft gear of ample capacity. A stabilizing pressure is needed to counteract a mine car's normal tendency to derail under push or buff.

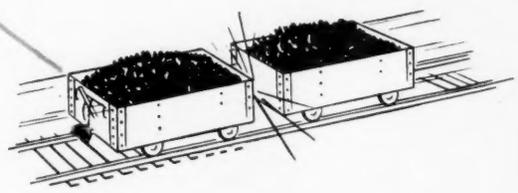
To meet these and other conditions peculiar to mine haulage, O-B discarded railroad-type designs and developed the coupler shown here — a coupler whose mine-engineered extras assure its proper functioning under mine service. Don't fail to investigate it if you are contemplating the purchase of new mine cars. A postcard request will bring full information.

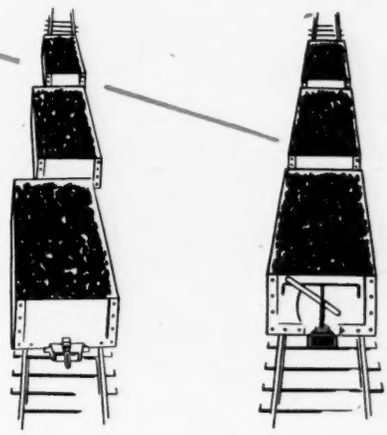
Ohio Brass

MANSFIELD, OHIO

Canadian Ohio Brass Co., Ltd., Niagara Falls, Ontario

2756-AM





EXTRA-CAPACITY DRAFT GEAR

Tough, springy rubber buffing pads replace breakable steel springs in O-B's modern draft gear assembly. Completely enclosed, the rubber draft gear will absorb impact blows up to 50,000 pounds — as much as 100,000 pounds on the new Form-8 design.

INCREASED TRACK STABILITY

New in principle, the improved Form-8 Coupler actually helps to keep your mine cars on the track by preventing buckling under push or buff. Cars are held in center-to-center alignment on the track, are not allowed to zigzag as is the car's normal tendency under push or buff.

Ring the Bell in Modern Mining with...

LA-DEL

Shaker... Chain... Belt

CONVEYORS

AND JOY LOADERS

More tons per man-shift

Smooth, steady flow of coal from face

Low cost operation—Minimum maintenance

Easily moved and installed

Dependable performance

Plus

A COMPLETE ENGINEERING SERVICE FOR DESIGN, PLANNING AND INSTALLATION

Rugged and easy to operate, mobi
Loaders maintain maximum loa
rates, producing coal fast, at lower

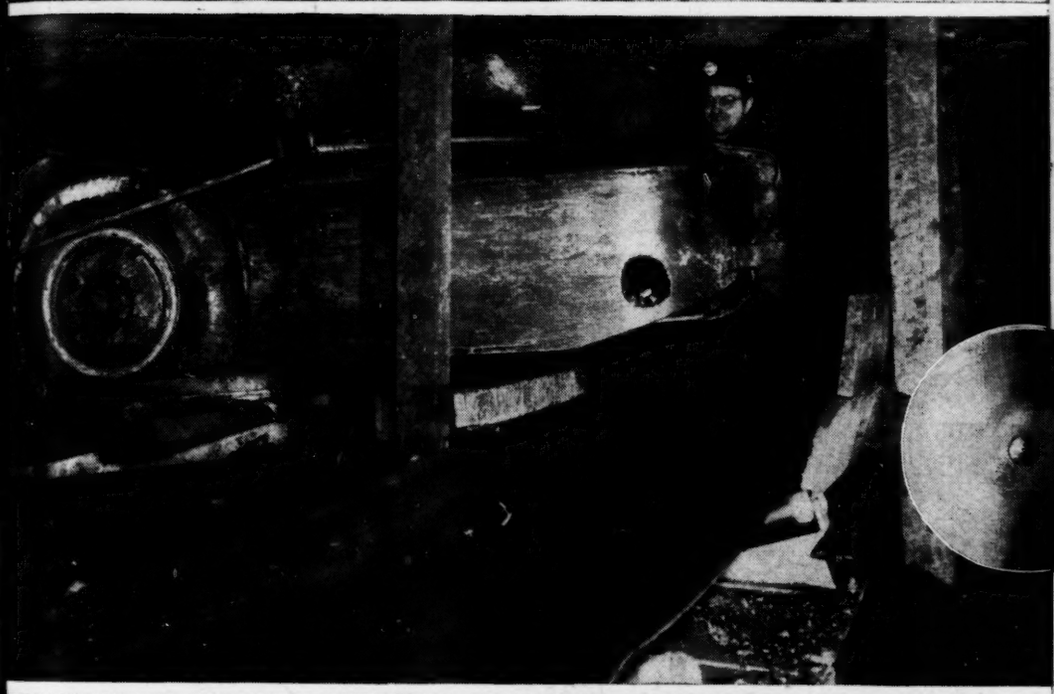
LA-DEL DIVISION **JOY**

SHAKER CONVEYORS

have Cushion Drive

Cushion stroke reduces shock loads and maintenance costs. Turns made up to 90 degrees. Extensions or reductions in conveyor length easily accomplished with minimum manpower and effort.

write for Bulletin



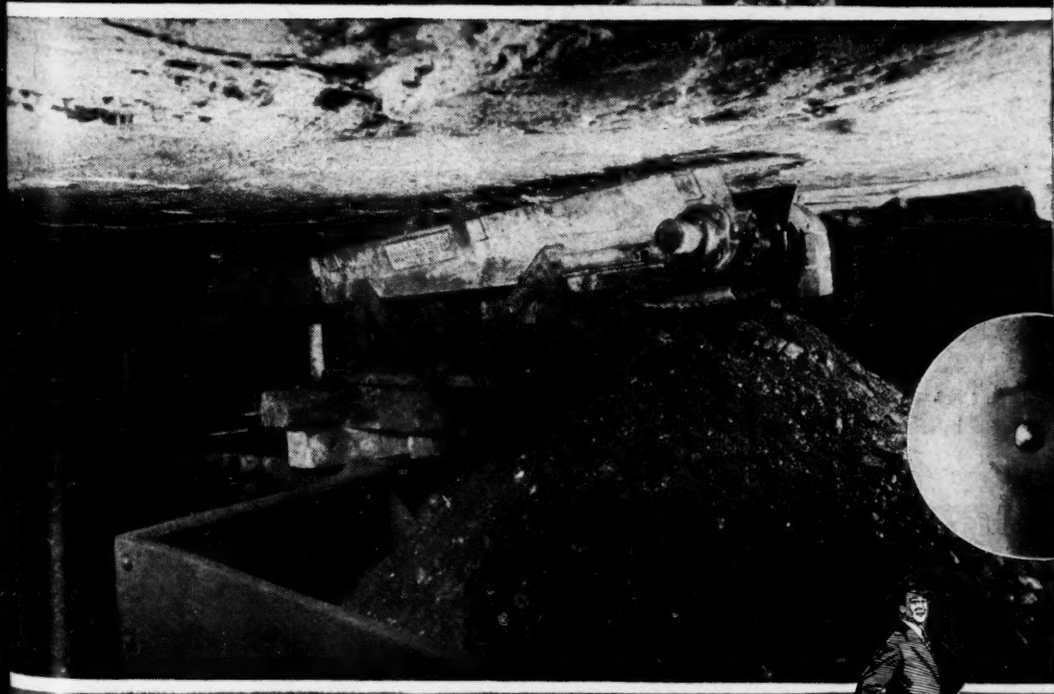
LA-DEL Underground

BELT CONVEYORS

in Room, Haulage and Gathering Types

For a continuous, smooth flow of coal, especially on rolling and dipping mine bottoms, depend on La-Del low belt tension units. All idlers have exclusive sealed-for-life anti-friction precision bearings.

write for Bulletin



LA-DEL Underground

CHAIN CONVEYORS

in Room, Face and Gathering Types

Compact, lightweight, designed for efficient, low cost operation, and long life under difficult conditions. Reversible drives; may be mounted on either side of these chain conveyors.

write for Bulletin

Consult a Joy Engineer

MANUFACTURING COMPANY

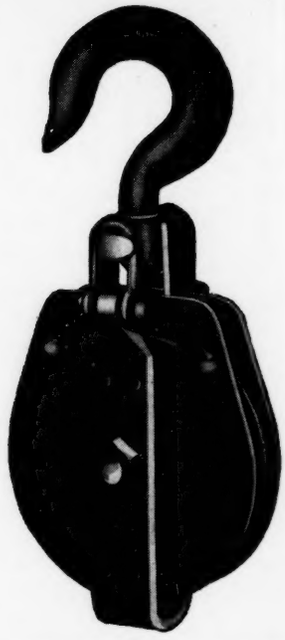
General Offices: Henry W. Oliver Building, Pittsburgh, Pa.

W&D CL-826

WIRE ROPE

HOIST HOOKS

WIRE ROPE THIMBLES



WIRE ROPE SNATCH BLOCKS

DELIVERIES ARE GOOD!

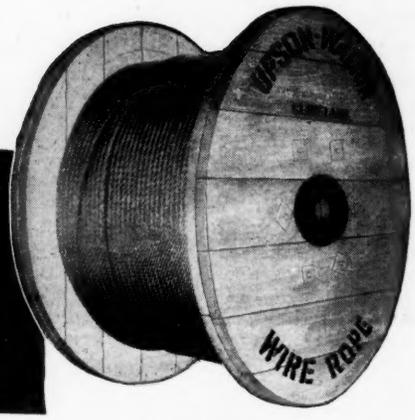
Deliveries are reasonably good on all items illustrated; in many cases we can ship from stock, in others within 30 to 90 days. Specify Upson-Walton for good delivery, good service, good quality. Order now from your jobber!

DIAMOND FRAME
WIRE ROPE BLOCKS

U-W

Established 1871

NOTE: As we go to press, deliveries on turnbuckles and shackles are also good.



THE UPSON-WALTON COMPANY

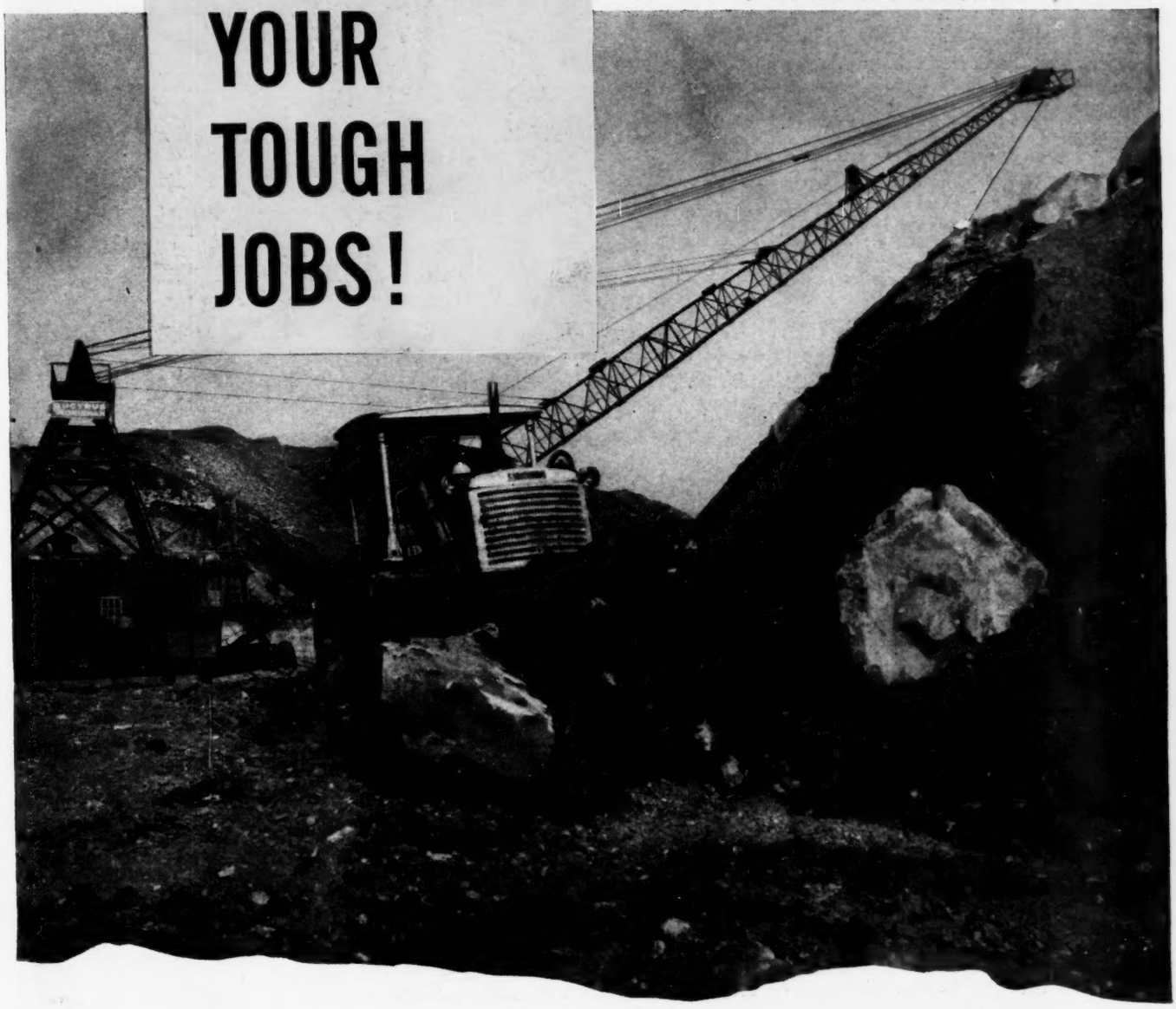
Manufacturers of Wire Rope, Wire Rope Fittings, Tackle Blocks

MAIN OFFICES AND FACTORY: CLEVELAND 13, OHIO

114 Broad Street, New York 4 — 737 W. Van Buren Street, Chicago 7 — 241 Oliver Building, Pittsburgh 22

BRING ON YOUR TOUGH JOBS!

A "Caterpillar" Diesel D7 Tractor bulldozing rock and boulders, building set-up for drag-line on coal-stripping operation near Heckscherville, Pa.



FEW coal-stripping jobs present tougher operating conditions than those at Pine Knot, near Heckscherville, Pa. Here the Capparell Stripping Construction Co. has a total of 27 "Caterpillar" Diesel units at work. They include 17 drag-lines powered by "Caterpillar" Diesel Engines, 7 "Caterpillar" Diesel D7 Tractors equipped with bulldozers, and 3 "Caterpillar" Diesel-powered compressors running the drills.

The country is hilly and rugged, requiring plenty of heavy tractor work to build set-ups for the drag-lines and roads for the trucks.

Says Mr. S. T. Capparell: "Those tractors are getting a real beating around this territory of rock and boulders, but they're doing everything you claim for them—and more too!"

Owners expect more from "Caterpillar" Diesels, and *get* it. These sturdy machines are built to take the toughest jobs in their stride and keep right on rolling up profitable work hours for the men who own them.

CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS

CATERPILLAR DIESEL

ENGINES • TRACTORS
MOTOR GRADERS
EARTHMOVING EQUIPMENT

Split-Second Timing is the answer . . .

ATLAS ROCKMASTER BLASTING SYSTEM

Gives You Less Bark . . . More Bite

In skiing, championship results come from the right equipment plus know-how plus split-second timing. With Rockmaster, the blaster is now able to time the delay elements of his shot in thousandths of a second—a control of timing never before possible. The impact it has brought to blasting is tremendous because after the rock is hit once, it is hit again . . . a split-second later . . . with sensational results.

The payoff in performance has been remarkable. In blasting operations all over the country fragmentation has increased—in many instances as much as 30%. Shovel efficiency has been stepped up. Secondary shooting has been held to a minimum. And . . . believe it or not . . . complaints about noise and vibration have become practically negligible in most cases, even when more holes are shot at one time!

Of course, split-second timing is only part of the answer. For Atlas Rockmaster is not just a device. Rockmaster is a complete blasting system. All factors of the blasting problem—detonators, explosive and loading—are taken into account and combined with your know-how and ours to produce true Rockmaster effectiveness.

Call in your Atlas representative. Ask him to tell you how our knowledge of explosives and your knowledge of the job can be combined to produce outstanding results.

Manasite: Reg. U. S. Pat. Off. "ROCKMASTER"—Trademark

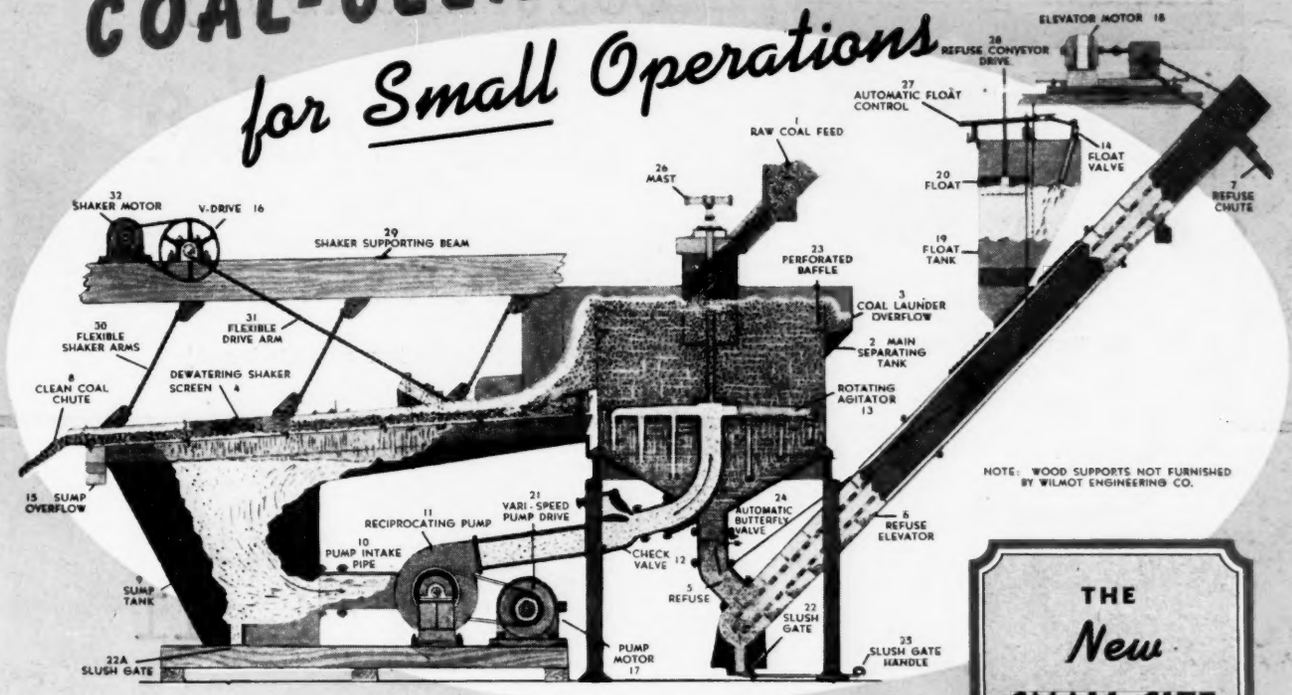
ATLAS EXPLOSIVES

"Everything for Blasting"

CHEMICALS ATLAS EXPLOSIVES

ATLAS POWDER COMPANY, Wilmington 99, Del. • *Offices in principal cities* • *Cable Address—Atpowco*

Now . . . A FULLY AUTOMATIC COAL-CLEANING UNIT for Small Operations



THE *New* SMALL-SIZE *Wilmot* HYDROTATOR

HERE'S NEWS... about How You Can Now Prepare Coal Automatically and Efficiently in a Small Tonnage Plant

This new Wilmot Hydrotator now enables operators of small mines, silt and refuse banks, rivermen and others to mechanically prepare coal with an efficiency, economy and controlled quality equivalent to that of large operations. That's why it is proving important news.

The new small-size Wilmot Hydrotator is a complete operating unit. It's simple. It's fully automatic, with self-regulation for any changes in quality and quantity of intake. During periods of interrupted feed there is no loss of good coal because automatic controls close butterfly valve in refuse discharge line. It cuts costs dramatically: needs only part of one man's time for routine maintenance; uses less than 60 gallons of water per min.; requires only 5 to 7½ horsepower for pump, and 1 each for dewatering screen and refuse conveyor. Diameter of cone, 2 ft. 6 in.

An individual unit is used for cleaning each of these sizes: Pea, Buck No. 1, Rice, Barley, No. 4 and No. 5. Feed capacity, 10 to 20 tons per hour. Let us send you further details of how this new unit increases quantity and quality of yield.

W WILMOT

WILMOT ENGINEERING CO.

HAZLETON, PA.
Plant:
WHITE HAVEN, PA.

Wilmot Coal Preparation Equipment: Hydrotators • Hydrotator-Classifiers • Hydro-Separators • Simplex Jigs Crushing Rolls • Sizing Shakers • Bucket Elevators • Conveyors • Car Hauls • Keystone Rivetless Chain, etc.

WILMOT BUILDS BETTER BREAKERS

APPROVED
FOR SAFETY

"APPRO. NO. P-105" molded into the jacket of Rome 60 Mining Cables is the official okay of the State of Pennsylvania. It means that these tough cables conform to all safety regulations in that State. They're super flame-resistant.

ROME 60 MINING CABLES

ROME 60
Four-conductor
Power Cable
Type W

APPROVED
FOR PERFORMANCE

For years mine operators have placed full confidence in the superb performance qualities of Rome 60 Cables. They're designed and constructed to stand the gaff of long, trouble-free service under the most severe conditions.

The Rome 60 Line includes:

SINGLE CONDUCTOR
LOCOMOTIVE GATHERING CABLE

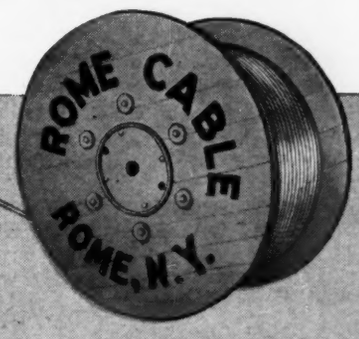
TYPE W PORTABLE POWER CABLE

TWO CONDUCTOR
CONCENTRIC MINING MACHINE CABLE

PARALLEL (TWIN)
DUPLEX MINING MACHINE CABLE

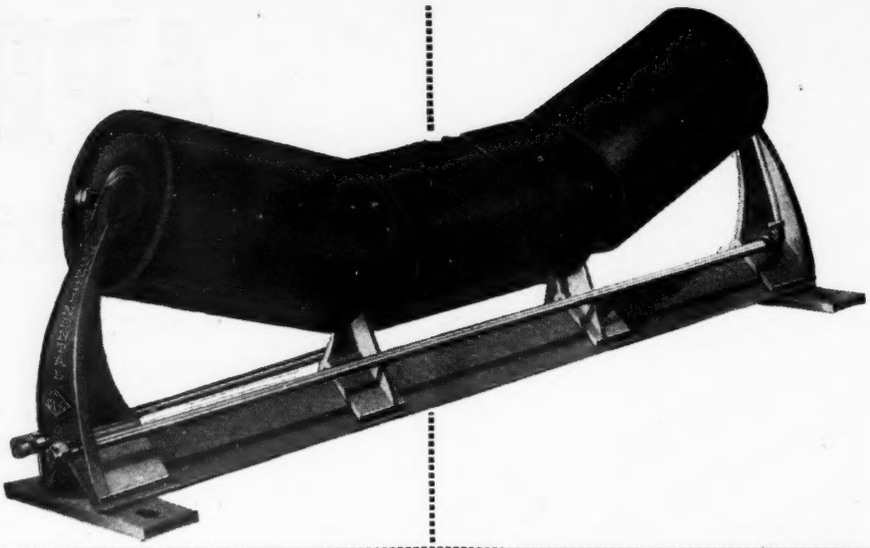
FROM BAR TO FINISHED WIRE

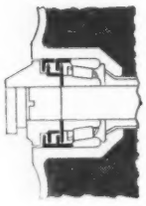
ROME CABLE
CORPORATION
ROME • NEW YORK



HERE'S WHY CONTINENTAL IDLERS ARE

- √ long-lasting
- √ trouble-free
- √ economical





POSITIVE BEARING PROTECTION

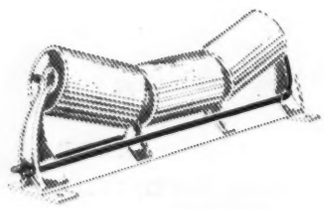
Five pass labyrinth grease seals prevent foreign matter from entering bearings and keep grease from being thrown out. This assures longer life and better performance with less maintenance attention.

INVERTED "V" CONSTRUCTION

Basic design of Continental Idlers is the inverted "V". Spillage of materials over edge of belt—even wet sand and cement—shed off like rain on a steep roof. No more piling up of spilled materials to interfere with proper performance of the rolls.

PATENTED NUT

Patented malleable iron nut has several functions. Provides accurate means of adjusting bearings; forms one passage of labyrinth grease seal; spaces and protects inner grease seals. Socket recess in nut fits over supporting bracket to tie brackets together and at the same time allows rolls to be easily removed.



EASE OF LUBRICATION

Extended grease pipe from center roll is standard construction. This permits greasing of all rolls from outside for safety. All grease pipes may be extended to one side for convenience. Alemite button head fittings are standard.

RUGGED STRENGTH

Heavy ribbed certified malleable brackets to absorb shock are jig-welded to heavy angle base. Socket recess in patented nut ties rolls to bracket, gives the practical equivalent to one-piece construction throughout.

NO OTHER IDLER GIVES YOU ALL THESE FEATURES

Write now for our Belt Conveyor Engineering Handbook ID 107, giving detailed data on Continental's complete line of all-purpose idlers in addition to complete engineering information on Belt Conveyor design.

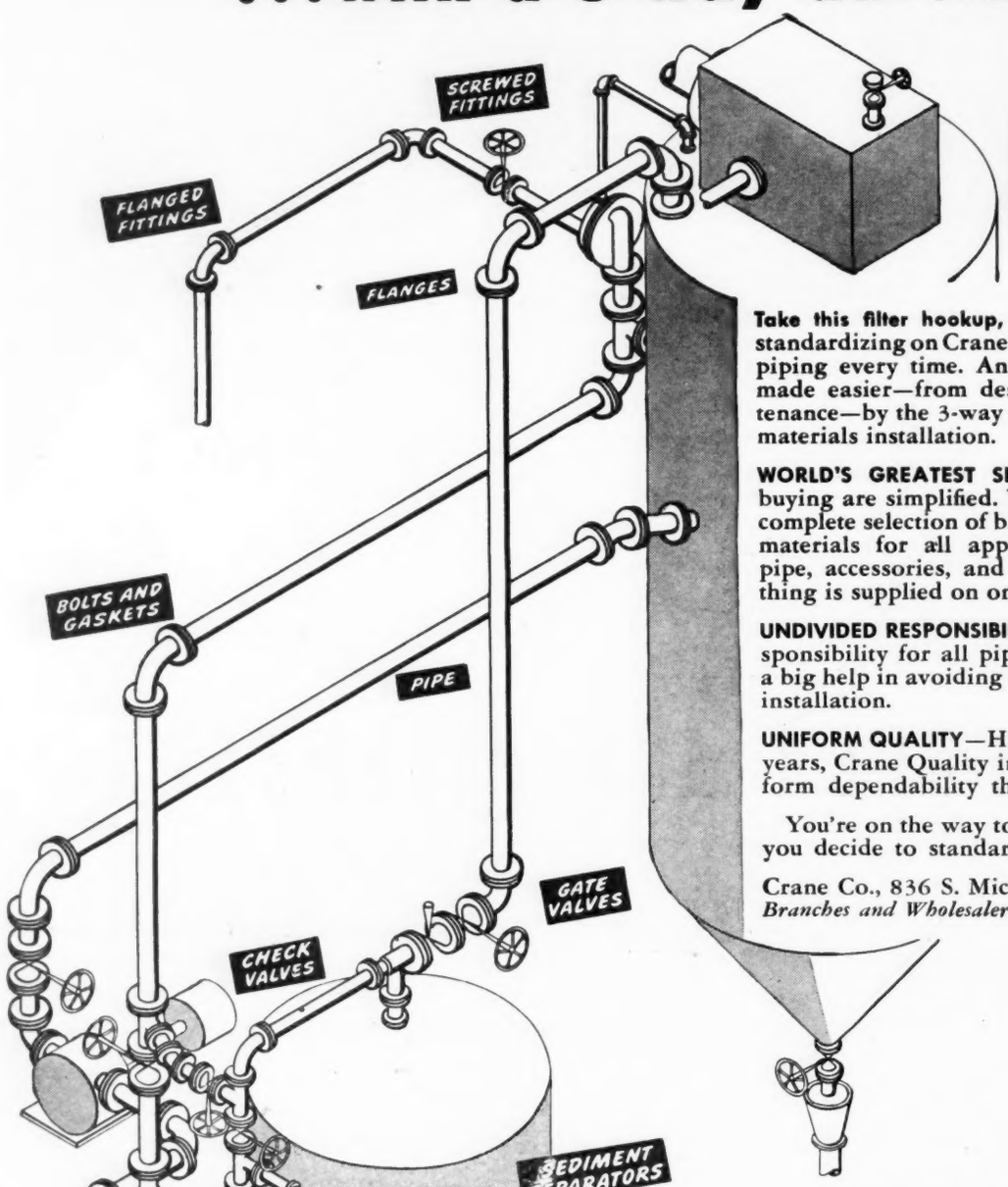
INDUSTRIAL DIVISION

CONTINENTAL GIN COMPANY

BIRMINGHAM, ALABAMA

CGC ATLANTA • DALLAS • MEMPHIS CGC

The ONE way to better piping ...with a 3-way advantage



ONE

SOURCE OF SUPPLY
RESPONSIBILITY
STANDARD OF QUALITY

Take this filter hookup, for example, to see how standardizing on Crane equipment results in better piping every time. And how any piping job is made easier—from design to erection to maintenance—by the 3-way advantage of an all-Crane materials installation.

WORLD'S GREATEST SELECTION—Specifying and buying are simplified. You choose from the most complete selection of brass, iron, and steel piping materials for all applications. Valves, fittings, pipe, accessories, and fabricated piping—everything is supplied on one order to Crane.

UNDIVIDED RESPONSIBILITY—You put complete responsibility for all piping materials on Crane—a big help in avoiding delays and getting the best installation.

UNIFORM QUALITY—Highly respected through 90 years, Crane Quality in all materials assures uniform dependability throughout piping systems.

You're on the way to better piping the moment you decide to standardize on Crane equipment.

Crane Co., 836 S. Michigan Ave., Chicago 5, Ill.
Branches and Wholesalers Serving All Industrial Areas

(*Right*) **IN PATTERNS FOR EVERY NEED**—*Crane Standard Iron Body Wedge Gate Valves. Improved body design reduces weight, yet increases strength. Straight-through ports assure streamlined flow. All parts developed to give dependable, durable service. For steam pressures up to 125 pounds; 200 pounds cold. See your Crane Catalog, pp. 101-106.*

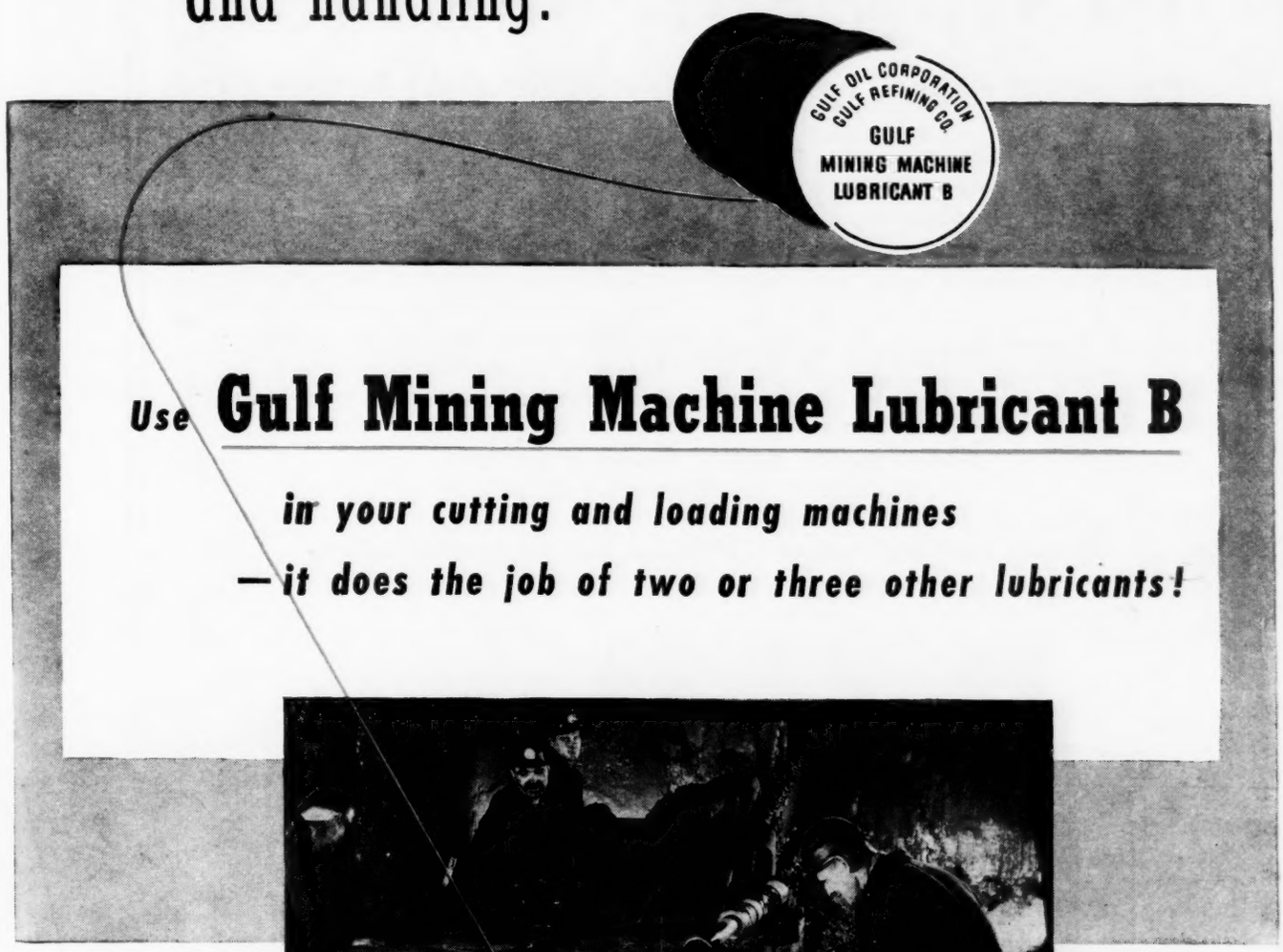
EVERYTHING FROM . . .

VALVES • FITTINGS
PIPE • PLUMBING
HEATING • PUMPS

CRANE

FOR EVERY PIPING SYSTEM

How to simplify lubricant storage and handling:



Use Gulf Mining Machine Lubricant B

in your cutting and loading machines

—it does the job of two or three other lubricants!

YOU benefit in two important ways when you use Gulf Mining Machine Lubricant B in your cutting and loading machines: (1) You get improved lubrication and reduced maintenance costs. (2) You simplify lubricant storage and handling, for this new Gulf development does the job of two or three other lubricants.

A heavy-bodied lubricant specially engineered by Gulf technologists for cutting and loading machines, Gulf Mining Machine Lubricant B lasts longer, has greater tenacity, insures less leakage from gear cases, and provides effective lubrication under water conditions.

Call in a Gulf Lubrication Engineer today and ask him to demonstrate the many advantages of this superior mining machine lubricant. Write, wire, or phone your nearest Gulf office.

Gulf Oil Corporation · Gulf Refining Company

Division Sales Offices:

Boston · New York · Philadelphia · Pittsburgh · Atlanta
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GULF INDUSTRIAL LUBRICATION

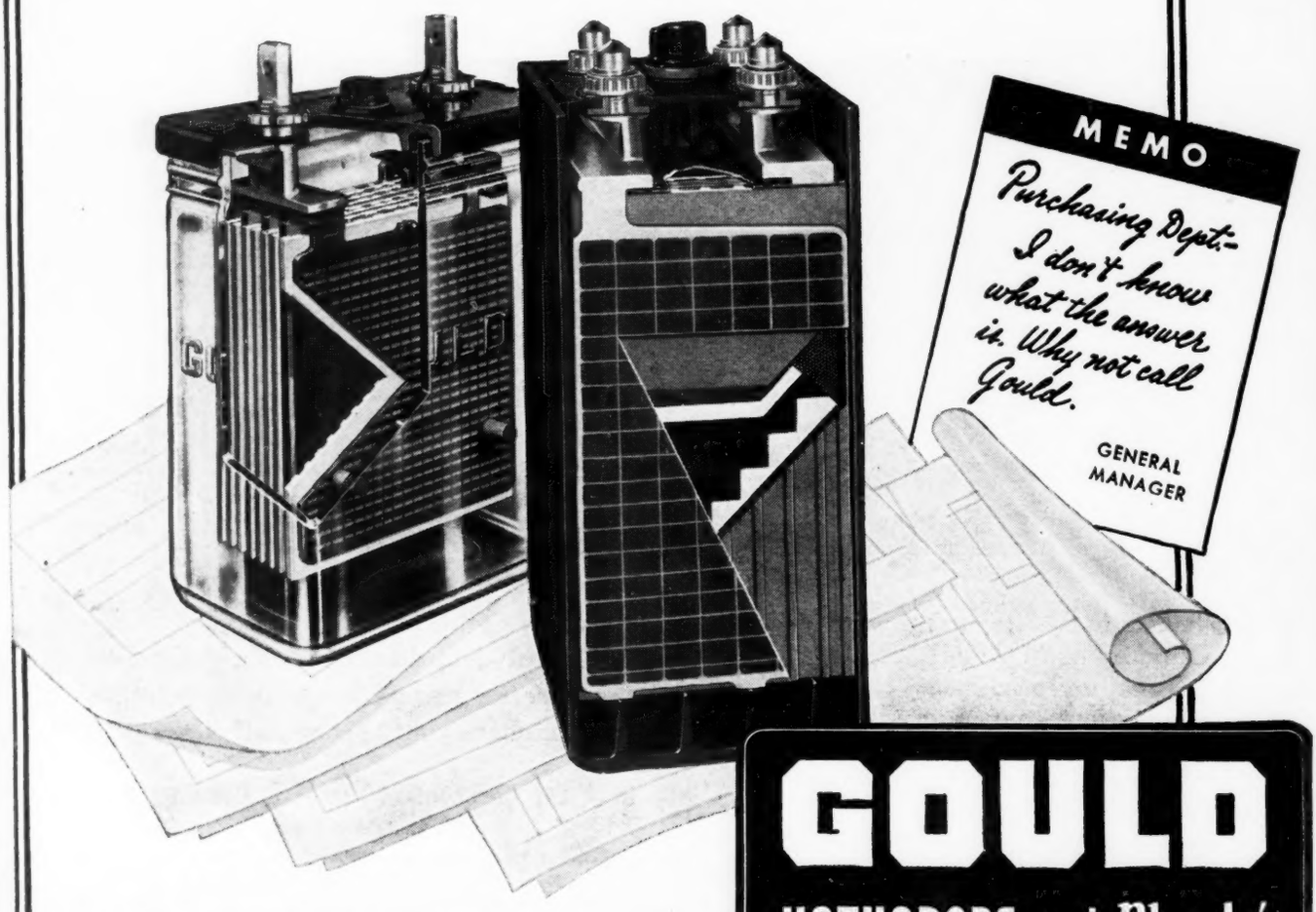
DESIGN FOR SERVICE

Gould will design, build, and install the right battery to do your job

To get the best results every industrial storage battery must be designed to perform a particular task. Each must have the capacity necessary to meet power requirements. Each must be built to fulfill all service demands.

Specialization in designing and manufacturing storage batteries has long been a Gould tradition. Gould research men and engineers have a thorough knowledge of storage batteries. They have developed special battery equipment to meet exceptionally severe operating conditions. For full information write Dept. 111, Gould Storage Battery Corporation, Depew, New York.

Before putting in a new storage battery installation, or replacing an existing setup, call Gould

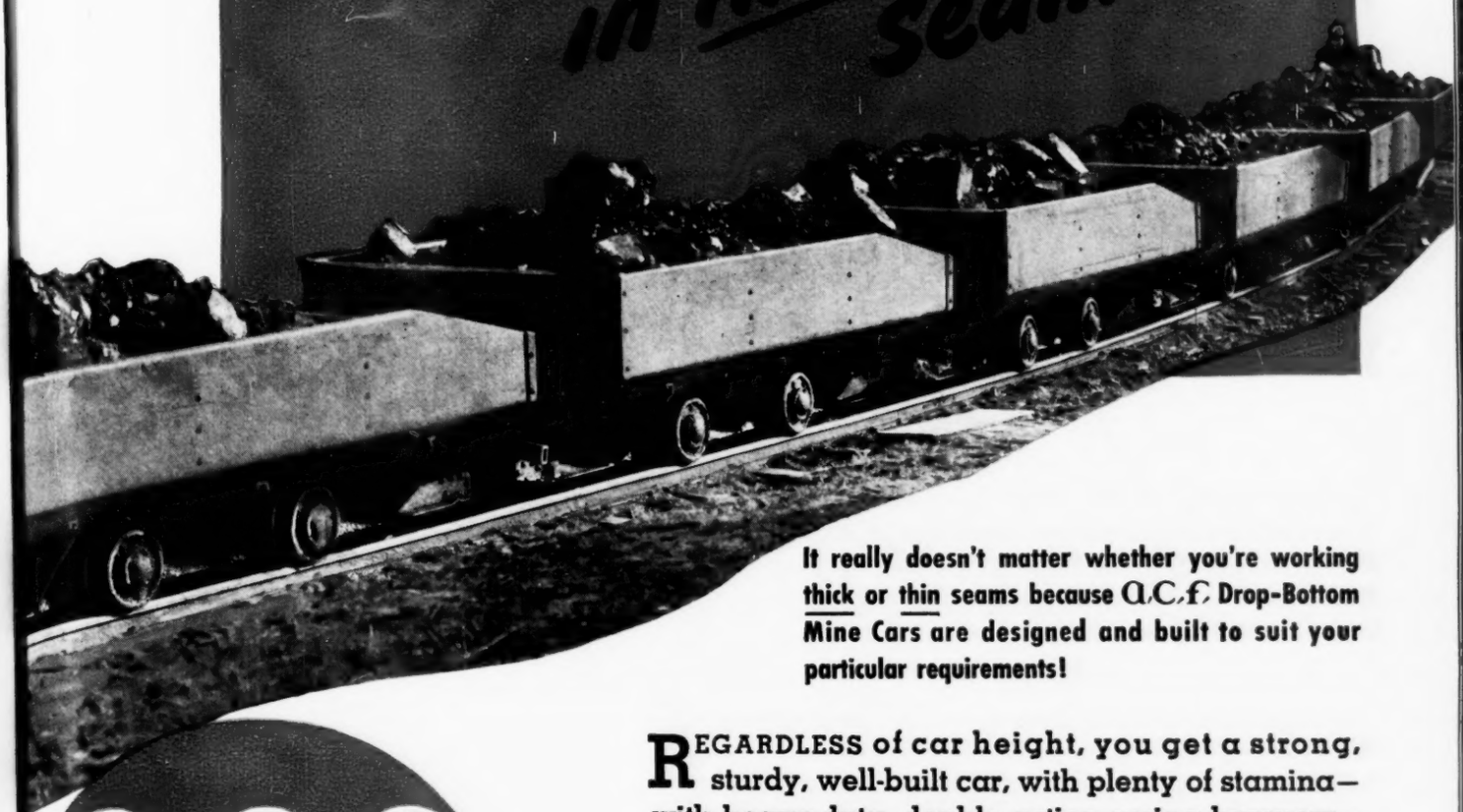


GOULD STORAGE BATTERY CORPORATION, Depew, N. Y. Service Centers: Atlanta • Boston Buffalo • Chicago • Cincinnati • Cleveland • Detroit • Kansas City • Los Angeles • New York Philadelphia • Pittsburgh • St. Louis • St. Paul • San Francisco • Seattle • Zanesville

GOULD
KATHANODE and Planté
BATTERIES

LOWER COSTS PER TON

in thick or thin seams



It really doesn't matter whether you're working thick or thin seams because a.c.f. Drop-Bottom Mine Cars are designed and built to suit your particular requirements!

a.c.f.

DROP-BOTTOM MINE CARS

REGARDLESS of car height, you get a strong, sturdy, well-built car, with plenty of stamina—with heavy-duty, double action spring bumpers—with doors that are "lubricated"—with anti-friction bearings in the wheels!

The unusual speed at which a.c.f. drop-bottom cars can be dumped makes them especially suited to mechanical mining. Rapid, automatic unloading at the dump hopper allows quick return of cars to the loading point—provides greater loading machine efficiency—permits lower production costs per ton!

Our sales representatives are anxious to discuss the advantages of this type car with you—for use in *thick* or *thin* seams!

AMERICAN CAR AND FOUNDRY COMPANY

New York • Chicago • St. Louis • Cleveland • Washington • Philadelphia • Berwick, Pa. • Pittsburgh • Huntington, W. Va.

WALWORTH LUBRICATED PLUG VALVES

offer these advantages

- . . . Direct port opening
- . . . Quarter turn opens or closes valve
- . . . Dead tight shut-off
- . . . Freedom from attack by fluids being handled
- . . . Pressure sealed
- . . . Made in a complete line. Sizes from ½" to 24" for pressures from 175 to 5,000 psi., and for vacuum requirements

THESE are just a few of the reasons why Walworth Lubricated Plug Valves give "top" performance on many *difficult* services.

All Walworth Lubricated Plug Valves employ special insoluble lubricants which protect the plug and body against contact with the line fluid, thus combatting erosion and corrosion.

The lapped surfaces of the valve are "pressure sealed" when the valve is in either the open or closed position. By turning the lubricant screw, lubricant is forced under high pressure through a grooving system that completely encircles the ports as well as the top and bottom of the plug.

The lubricant seals the valve against leakage, and reduces friction between plug and body. This permits easy, quick, full-opening, or tight shut-off with only a quarter turn of the plug.

Number 1700 (illustrated) is a Steel-iron valve, wrench operated, designed for a working pressure of 200 pounds WOG (water, oil, or gas). Valves are available in either screwed or flange types. Screwed type have API line pipe thread lengths. Flanged type (No. 1700F) is faced and drilled to American Standard for 125-pound cast iron flanges unless otherwise specified.

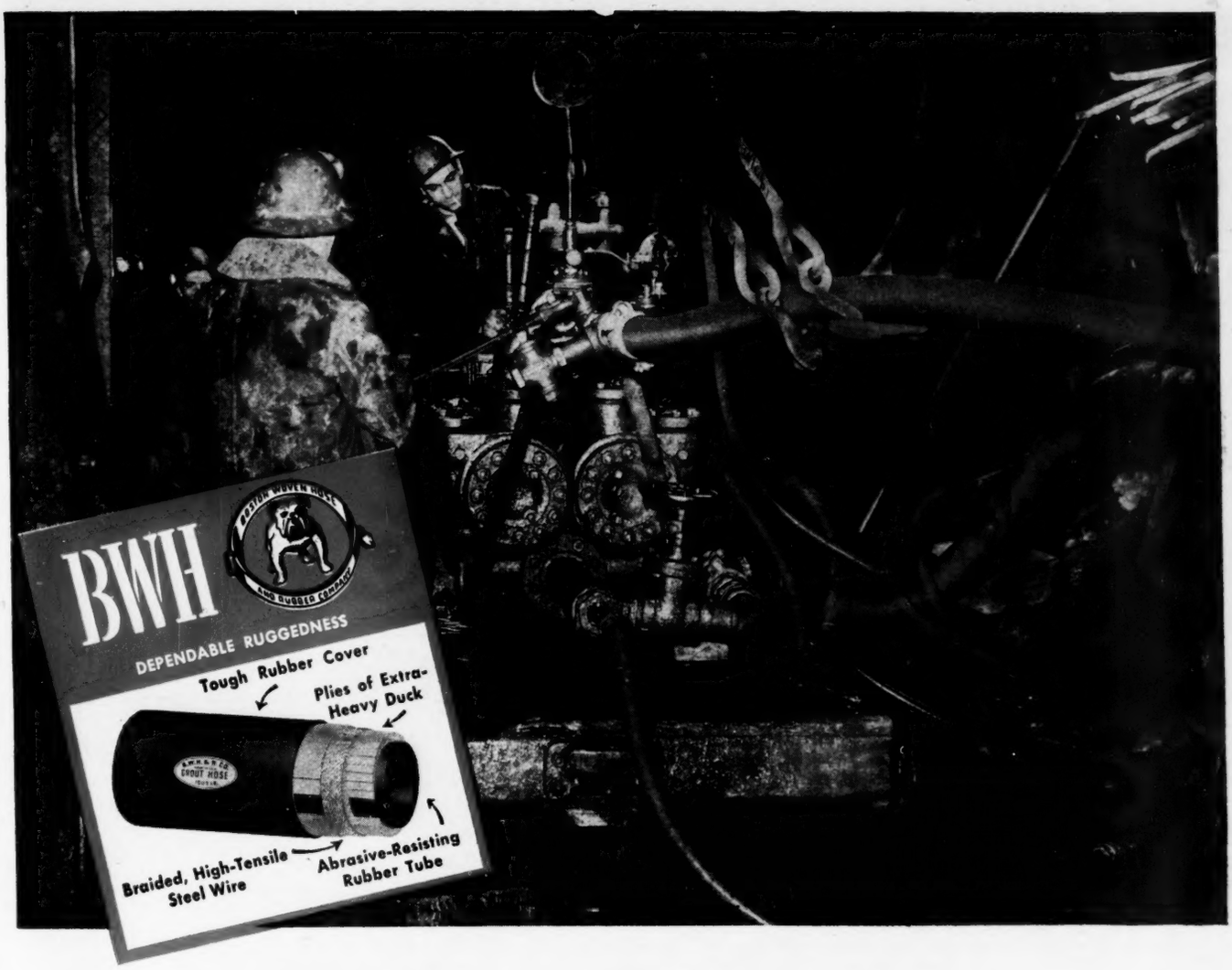
For further information about No. 1700 as well as the complete line of Walworth Lubricated Plug Valves, write for catalog.

WALWORTH

valves and fittings

60 EAST 42nd STREET, NEW YORK 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD



UNDERWATER TROWEL

Another problem solved by BWH

When a great river tunnel was under construction, water seeped through the seams of the excavated rock before the concrete lining could be applied. To plug these rivulets, a cement and sand mixture called Grout had to be pumped into the rock seams with rubber hose. The hose had to withstand pressures up to 1500 lbs. per square inch . . . and "take" the highly abrasive action of the Grout. For this difficult job, we recommended BWH Grout Hose.

This rugged hose is made with a high-grade, abrasive-resisting rubber inner tube. Plies of specially woven extra-heavy duck form the carcass. For flexibility, a spirally wound band of braided, high-tensile steel wire is imbedded beneath the two outer plies of duck along the entire length of the hose. Then tube and carcass are encased in a strong rubber cover, designed to withstand severe tunnel hazards. This tough BWH Grout Hose worked perfectly. Tunnel construction continued without costly delays. Grout Hose is just one of the many quality products manufactured by BWH. Whatever your need for industrial rubber goods, look to BWH for dependable ruggedness . . . BWH distributors for dependable service.

HAVE YOU A JOB WHERE STAMINA COUNTS?

Bring us your toughest problems . . . we're specialists in solving them. Consult your nearby BWH distributor, or write to us direct.

BOSTON WOVEN HOSE & RUBBER COMPANY

Distributors in All Principal Cities

WORKS: CAMBRIDGE, MASS., U. S. A. • P. O. BOX 1071, BOSTON 3, MASS.

"We want Trouble-free Operation in Solids-Pumps!"

" . . . and we're getting it! — pumping 7,000 gallons per minute with each of our three new A-C Solids Pumps" — says Kentucky Coal Operator.

WE HAD PLENTY OF TROUBLE pumping solids in one of our tipples. Pumps needed constant repair . . . downtime was slowing production . . . robbing profits. Then we replaced those pumps with Allis-Chalmers Solids Pumps and *haven't had a single minute of downtime since!*

That's why we specified A-C Solids Pumps for our new coal cleaning plant — and again we are able to report *not a single minute of downtime!*

Results like these are typical wherever A-C Solids Pumps are installed. Special abrasion-resistant alloy construction insures up to 4 times longer life! Simple design cuts downtime as much as 80% — parts inventory as much as 70%. Contact nearby A-C dealer or office today or write for 08B6381—ALLIS-CHALMERS, MILWAUKEE 1.

COMPARE SOLIDS PUMPS! No other pump can give you all these features!

Special abrasion-resistant alloy construction insures longer pump life.

Easy access to working parts simplifies maintenance — cuts downtime.

Entire rotating element can be removed without disturbing piping . . . simplifies maintenance.

Fewest total working parts to wear out — reduces repair costs, parts stock.

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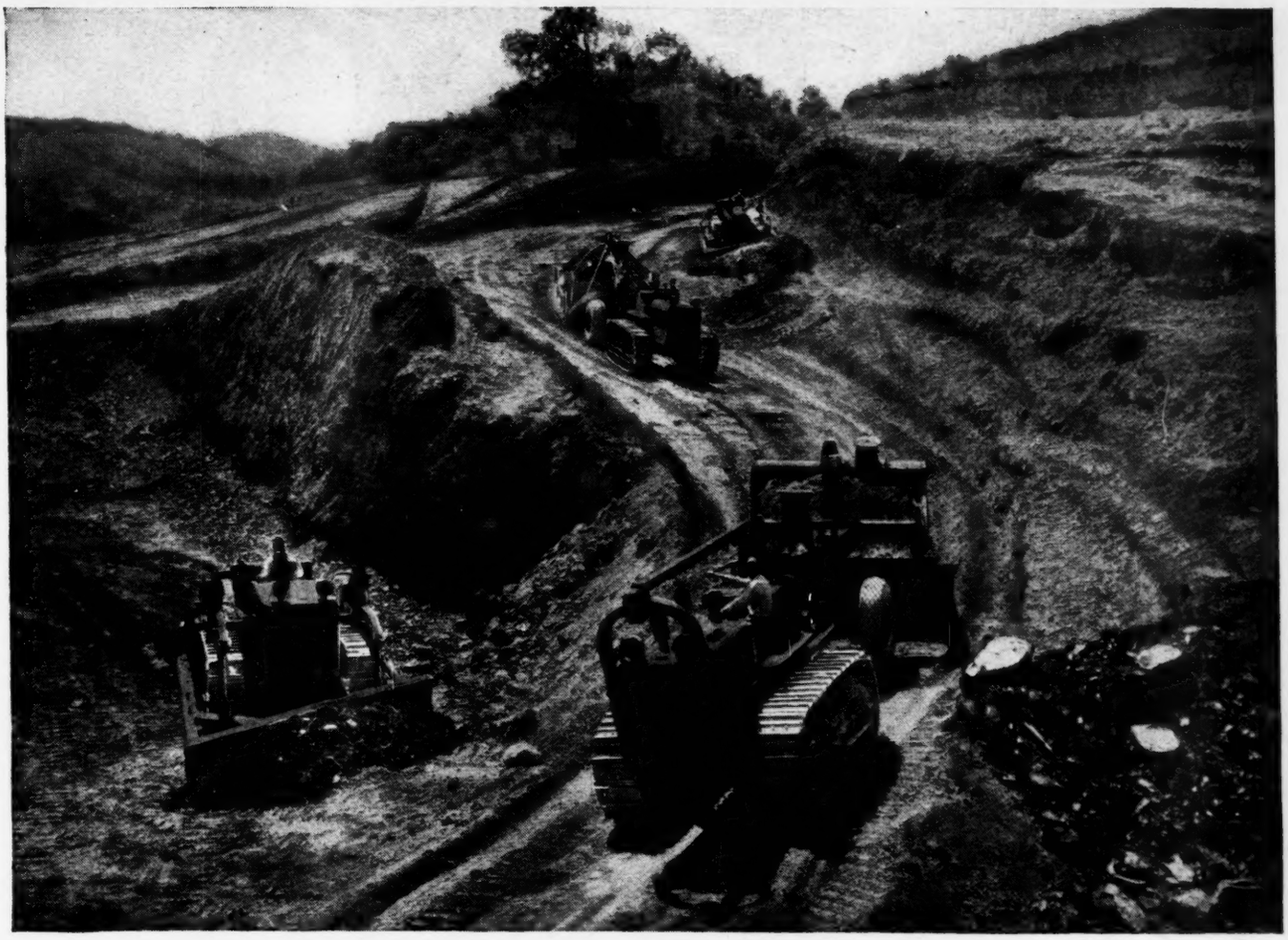

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Sahara Coal Company
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Ingle Coal Corporation
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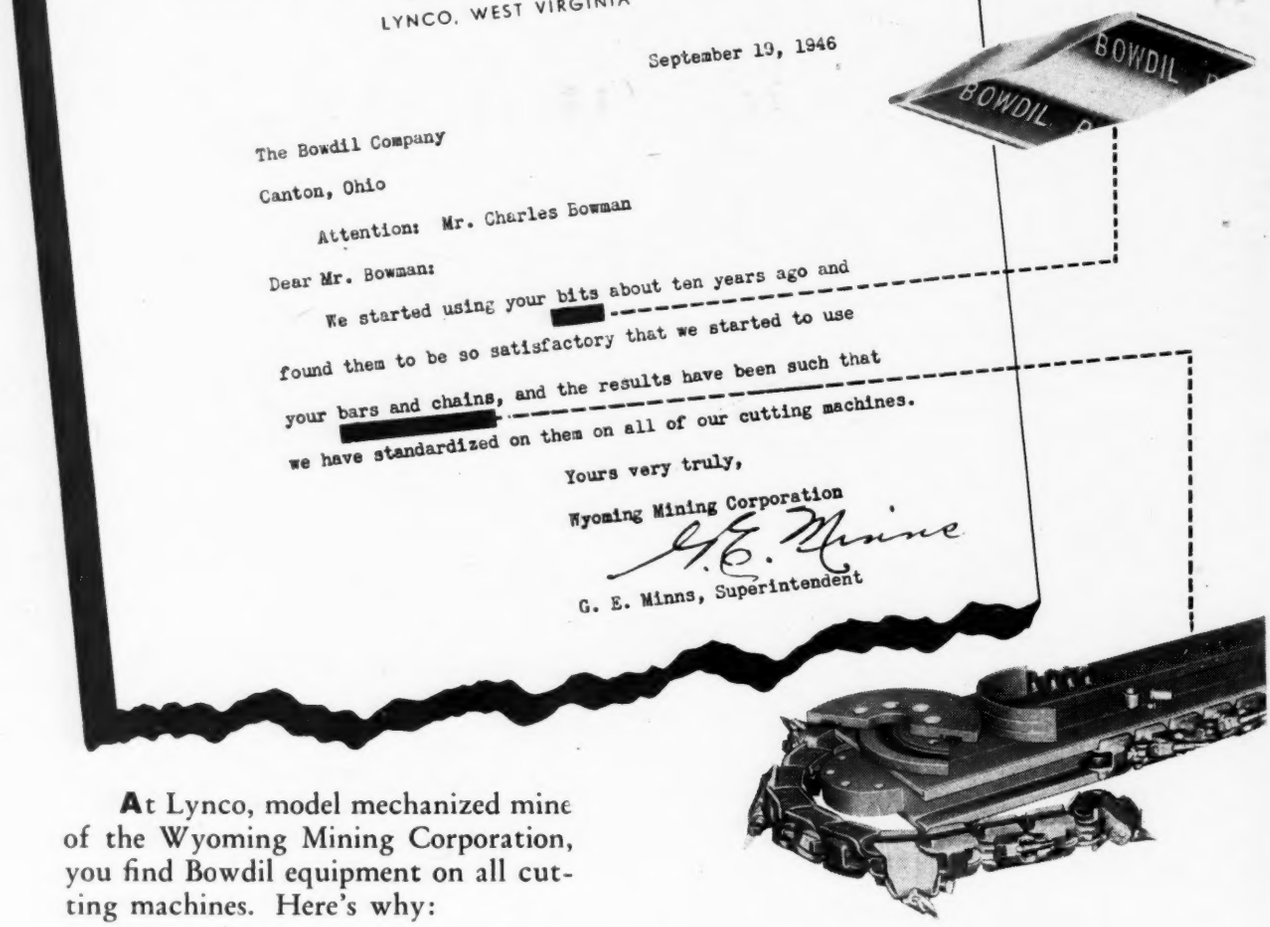

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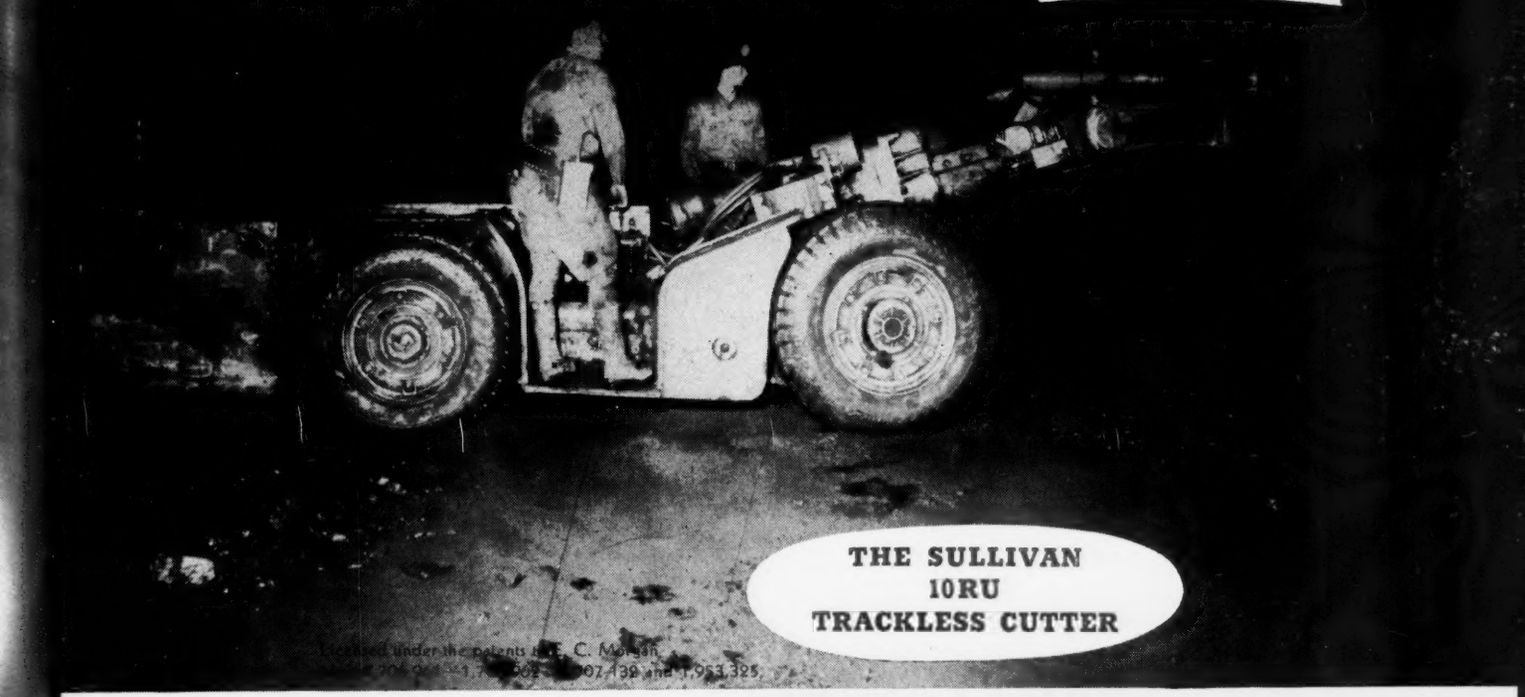

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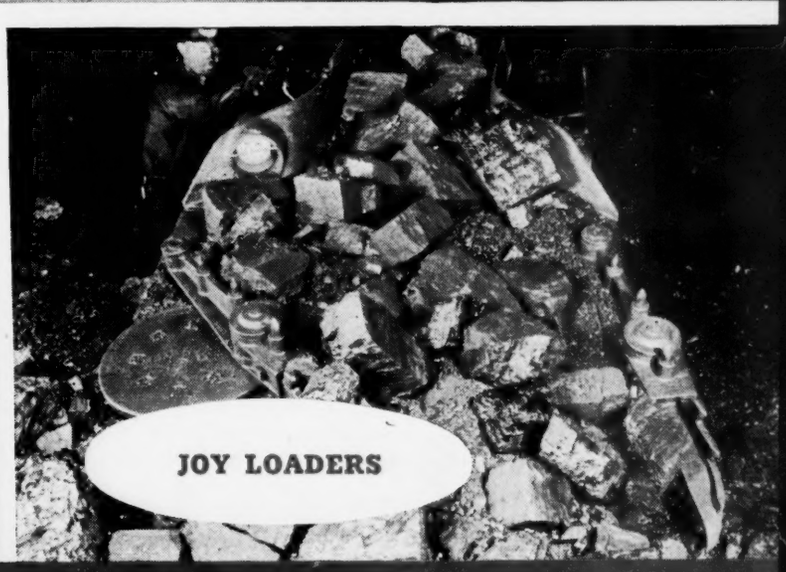

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DEVOTED TO THE OPERATING, TECHNICAL AND BUSINESS PROBLEMS OF THE COAL-MINING INDUSTRY

Coal Age

JANUARY, 1947

Ivan A. Given, EDITOR

Injury Compounded

FEARS that nationalization would result from seizure of the bituminous mines in 1945 proved well-founded when the Coal Mines Administration took over the mines of the Carter Coal Co. on Jan. 1 for the "account and risk" of the government because of refusal to pay the health and welfare tax, although Carter offered to pay it to the men or put it in escrow pending final decision on its legality. On Jan. 6, the Fox Mining Co., in northern West Virginia, also was taken over for refusal to take back a discharged employee. At the same time, the Navy, as agent for the Coal Mines Administration, was letting it be known that unless the operators conformed to all its interpretations of the Krug-Lewis agreement, it was prepared to take similar action elsewhere at any time. In other words, the Navy was serving notice that it was following a "tough" policy in the future. It also was letting it be known that that tough policy would be implemented not only by nationalization but, as in the case of the Fox Mining Co., by taking over sale of the product.

Getting tough is purported to be the result of official conviction that government control will make it difficult to get a contract signed between the union and the operators before seizure must come to an end June 30 as a result of the Truman proclamation of the end of hostilities issued Dec. 31. The Navy, it is said, is determined "to keep its skirts clean" and insist on what it considers complete fulfillment of the Krug-Lewis agreement until next June 30, although it and other federal officials apparently do not find worth considering what may happen to industry affairs in the meantime as a result of nationalization. How they reconcile the new "tough" approach with the "soft" attitude toward the numerous strikes and general union swath-cutting in the early days of seizure, not to mention the 60-day clause of the Selective Service and War Labor Disputes acts, also is unexplained. Even if it were assumed that the government was completely right in seizure and control of the mines, it cannot be concluded that the steps recently taken are either justified, correct or ultimately in the public interest.

Thus, penalizing owners for refusal of labor leaders to bargain becomes operation for the government account and risk. Thus, federal partiality and appeasement ends in nationalization—not as a result of federal policy expressed in legislation but by executive decree. Thus, the penchant of federal officials for "throwing their weight around," an outstanding impression of a personal investigation by *Coal Age*, becomes a new and foreboding administrative policy. Thus, the bitter end is reached in New Deal labor policy—or what passes for such policy.

The desire of federal officials "to keep their skirts clean" comes as somewhat ironic after the long years of intervention and partiality in relations between employers and workers. If they really had been interested in keeping their skirts clean, they would not have intervened in the first place, through seizure. They would not have followed this up by ignoring the law and refusing to return the mines not later than last Aug. 3, the ultimate date for return under the 60-day clause governing seizures. Instead of "getting tough," they might better obey the law, even if fairness and respect for cardinal principles in relations between the citizen and his government were not considerations, and get out of the seizure and nationalization business—forthwith.

The real cure, however, must go deeper. Reason, fairness and consideration of industry and public interests by both federal officials and unions is vitally necessary. Congress holds the key and is inclined to make use of it. Because operators have hoped seizure would be only temporary and mild, they have been disposed to withhold legal and other action to assert their rights because it might complicate return of their properties. Perhaps it is time to consider a change in that viewpoint, especially since the administration seems to feel that moderation on its part is unnecessary. Certainly, it is logical to put added pressure on presenting the industry's case to Congress and supporting to the utmost proposals for reforms in policy and legislation that really will foster sound relations between industry and its workers.

UNION RELATIONS:

★ Collapse and Its Effects

★ What Organization Means to Coal

★ How Organization Can Contribute

★ Fundamentals in Contract Making

By IVAN A. GIVEN, Editor

Change is in the air in the labor-relations field. But if the full benefits of that change are to be reaped, every person in the industry has the responsibility of taking every possible action to attain the desired goals. First of all, perhaps, is a re-examination of the objectives in labor relations and the practical methods of attaining them. Naturally, there is not nor will there be universal agreement on ways and means, but past experience and thinking should offer some hints as to the road to take. The following, growing out of years of discussion of labor-relations problems with men in the industry and outside, plus a recent review of problems and possibilities with leading operators, therefore is offered as a contribution to the thinking and planning that will be necessary to take full advantage of the new opportunity now promised for reaching a sound basis in relations between operator and miner.

WITH notable exceptions, coal operators and coal miners, in recent years, have found the formal wage contract the best approach to the problem of putting relations between them on the most workable basis. The Krug-Lewis agreement, one of the exceptions, broke the chain a second time in less than four years. It also set in motion forces that, among other things, resulted in nationalization—not in line with public policy given voice in legislation but by executive decree—of the Carter Coal Co. on Jan. 1 and the Fox Mining Co. on Jan. 6, 1947, probably the first examples of nationalization of private enterprises in United States history and certainly a radical departure from all the principles and practices heretofore considered basic in relations between the citizen and his government.

There are good reasons why coal and its workers will return to the contract method of promoting better relations—provided an equitable basis is reached and government interference is eliminated. The big questions are "When" and "On what terms." Until the answers are found, the industry's affairs remain unsettled, the public still is in peril of the discomforts and hazards attending production stoppages, and seizure poses the possibility that still more properties may be nationalized at the whim of federal officials.

Search into the causes for the uncertainty which hung over the coal industry as it entered 1947 leads to the conclusion that they stem from distortion of the real objectives of organization for collective bargaining, complicated by lack of understanding of how organization can help in reaching those objectives. The New Deal used organization of workers to keep itself in office and also as a means of implementing its implied if not overt goal of putting a spoke in the employer's wheel at every opportunity. Union officials, the record shows, were quick to take advantage of the grant of economic power to solidify their own commanding positions. As time went on, they became less and less disposed to submit themselves to the rigors of collective bargaining and more and more inclined toward arbitrary action. All this was scarcely calculated to persuade unconvinced employers and undoubtedly retarded advance toward eliminating the defects of collective bargaining and realizing its benefits to the fullest.

Coal has furnished the outstanding example not only of complete organization of workers but also of the effects of misunderstanding and abuse of its principles. It is not surprising, therefore, that confusion and discouragement engendered by contemplation of a hectic past and an uncertain future has, at times, directed thought toward the two choices of a man crowded into a corner: (a) giving up and retiring from the field or (b) offering battle to the last ditch.

Perhaps that time has yet to come for the coal operator and perhaps it never will, especially if recent events may be construed correctly as the end of one era in labor relations and the opening of a new and better one. But the happenings of the recent past nevertheless have led some operators, with some justification, to take a chance that the hazards of a split in the operators' ranks and further deferment of work on a new agreement would be offset by the possibility of help in negotiations through legislation or court decision.

The courts will decide and the legislation to be expected may be helpful, but it is doubtful, even if it arrives soon, that it will relieve either party of

With the proper approach and full understanding of objectives, joint effort by organized workers and employers, not only in contract making but in other directions, helps set the stage for progress.

the responsibility of taking sound steps to promote good labor relations. In short, the basic problem will remain and, if legislation is not well thought out and sound, might well be complicated. It will be just as essential for employers and workers to do their own getting together, reasonably and peacefully, in the future as in the past.

Coal-Mining Goal

Granting the soundness of that conclusion, perhaps it is time for another look at what coal seeks in relations with its workers and how best these goals might be attained. Good wages, good working time, good working conditions, good living conditions, stability in the area of greatest cost (labor), cooperation in increasing productive efficiency, better service to the consumer and elimination of work stoppages are among the goals of good relations between operator and miner.

Perhaps the first point revealed in a re-examination of the labor-relations picture in coal mining is the inherent factor that dealing with an organization representing workers, in spite of its natural difficulties, makes for stability in one important field—wage cost. The need for joint action in stabilizing wages was recognized as far back as 1886, when operators joined with miners in a call for the conference that resulted in an agreement establishing the old Central Competitive Field. It was the prevailing sentiment of the industry in 1931 when *Coal Age*, in suggesting a "Stabilization Program for the Bituminous Industry," was moved to include the following statement on industrial relations:

"Inherited prejudices in some fields and bitter personal experiences in others have made the idea of a revival of unionism obnoxious to many employers. Nevertheless, unless some new formula can be found, the conclusion seems inevitable that the desired stabilization of wages and working conditions must come through a recognition and an acceptance of an outside labor organization by a sufficiently large percentage of the operators to give the wages and working conditions so established a controlling influence in the districts where direct reognition is withheld."

Soon after, the entire industry was organized, largely for the reasons cited. Was that organization a good thing? In view of recent difficulties, the tendency might be to answer "No!" But unless government jurisdiction over wages and working conditions is accepted—the least desirable of the possible alternatives—the conclusion, after a hard look at the conditions peculiar to coal, is that the operators need the union. If that is accepted, it follows that they need a union with the strength to maintain discipline in its ranks and carry out its agreements to the letter. It follows further that strong, enlightened union leadership likewise is desirable. Weak, venal or subversive leadership is always, and particularly in these times, an invitation to the growth of subversive elements, destruction of the organization's effectiveness as a stabilizing influence, weakening of its ability to carry out its contracts and dampening of any desire on its part to help in promoting good relations and advancing the industry's interests. Vivid examples of the results of weak, venal or subversive leadership—or all three—already exist in certain other industries, some not too far removed from coal, such as metal mining.

But does the union need the operators? Can it afford to forget that maxi-

GUIDES TO GOOD RELATIONS

1. Distortion of the real objectives of organization for collective bargaining and lack of understanding of how organization can reach these objectives leads to controversy, collapse of relations and government intervention.

2. Under the conditions peculiar to coal mining, the operators need the wage stability an independent organization of workers can provide.

3. Miners need to work with operators in a realistic solution of industry problems; otherwise, the alternative is public reaction and government intervention —not always favorable.

4. If the principles of good relations are adhered to, strong organization and strong management promote solution of the industry's problems and foster progress.

5. Reasonableness and concentration on fundamentals make possible contracts and cooperative action protecting the rights and interests of both workers and management, preserving and strengthening the industry's competitive position by better service to the public and laying the groundwork for progress in other directions than wages, hours and working conditions.

mum service to the consumer is its basic problem also? In its 1931 stabilization program, *Coal Age* summarized the situation as follows:

Whether the labor organization recognized by the operators "shall be the United Mine Workers or some other new group equally independent of employer control rests largely with the existing union. It is faced with the task of convincing doubting operators that it has abandoned the practices which have made it highly objectionable to many producers and that it now has the vision and the judgment which will promise effective and constructive leadership."

Events since 1931 have proved the essential validity of that statement, as well as the validity of the conclusion that the union needs the operators and likewise needs to consider the interests of the miner and the interests of the public. The alternative to working with management is some form of government intervention as events have clearly shown. They also have shown that such intervention also can be severe on the union.

With the operator needing the union and the union the operator, the place where tolerance, understanding of principles and reasonableness become vital is in negotiating wage agreements. When employers and union fail to agree and the chain of contracts is broken, one or the other of two things happens—at least in the coal industry—there is a strike, with losses to the operator, the miner and the public, or the government takes over.

The Contract Problem

A contract is evidence that there has been a meeting of minds on the best way of promoting relations between employers and workers. It is not, however, an instrument for accomplishing undesirable objectives or attempting to attain ends better achieved by other methods. In short, it should reflect best judgment on hours, wages and working conditions, as hitherto generally understood, and should make clear and protect the respective rights of management and workers.

In discussing what should go into a contract and how, negotiators in earlier days concentrated principally on wages and hours. These still are the major matters, but in coal mining they sometimes have been overshadowed by other items in recent years. Yet wages and hours are the real meat of any contract, since the decisions in regard to them have a major bearing on the welfare of the industry and its workers through their effect on cost, prices and competition. When price increases in an industry consistently run ahead of increases in competitive industries, there is trouble ahead for all in that industry.

Key Factors in Rates

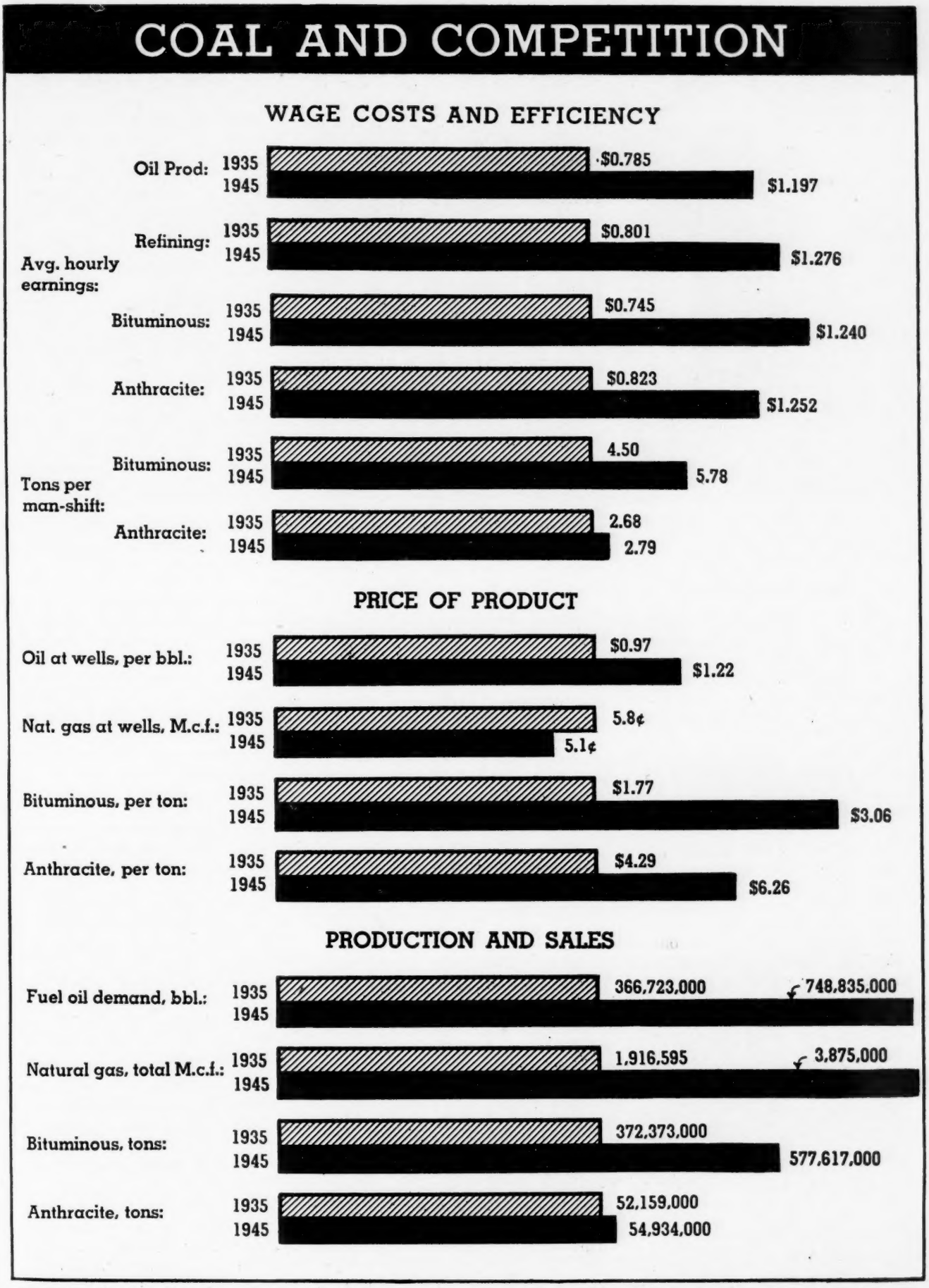
Wage cost is a direct result not only of rates but of worker productivity. Worker productivity in turn depends upon his own efforts plus investments by management in machinery and better methods to make those efforts produce more. In the long run, the worker or his representatives cannot afford to force more wages out of the coal industry than his share in increasing productivity warrants. Neither can the operator attempt to withhold from the worker what his efforts entitle him to. Furthermore—and equally if not more important—neither can afford to forget either the customer or their competition. All in all, therefore, when it comes to wages and hours, the real tests should be: (1) progress in productive efficiency and (2) the position of the industry in relation to its competition.

If these tests were sincerely applied to the questions involved in adjusting wages and hours, the times when a decision would have to be made to have a strike would be materially reduced. That would be a major step forward since strikes possibly have been greater factors in recent losses of business than cost increases, although the latter also have had no small effect.

When it comes to wages and hours, therefore, or to any other provisions, for that matter, the contract should reflect the desire of all parties to stimulate productive efficiency, to maintain and, if possible, improve the industry's position in relation to competition and to make sure that the worker, investor and public share equitably in the benefits of better operation, higher quality and increased efficiency. Equally important, both parties should approach the matter of mutual relations with the firm conviction that strikes are a luxury too expensive for either side and that they can be avoided by concentration on the fundamental factors in the industry situation.

The wage contract already is accepted as one effective means of protecting the rights of workers. It should also protect the rights of management, including the right of management to

COAL AND COMPETITION



Since it affects not only sales and profits, but also working time and employee earnings, industry's competitive position is a prime concern in contract making and other joint efforts of men and management.

be management. Alternatives have been proposed and tried many times but in the end it has been found that someone must direct the efforts of men and the use of machines if the necessary productive efficiency is to be obtained. In other words, supervisors with authority are a necessity and that authority cannot be abridged if management is to do its job.

It is in the interest of the workers and their representatives, therefore, to affirm the freedom of management and work to make it strong and efficient, because the worker needs management that knows its job and has the strength to discharge its responsibilities. Such management is further assurance that the worker's industry and company will stay in business and continue to provide him with a good job at good pay. The problem of where management leaves off and the workers' organization takes over is not insuperable. Logic and reasonableness can supply the answer. Having a strike to force anything but that answer is not conducive to advancing the best interests of either the worker or management.

Safety Considerations

Using the accepted standards of wages, hours and working conditions, it can be argued that contracts can cover such matters as promoting safety. Miners and operators can quite logically agree that promoting safety is a first consideration of both and that evidence of their intention to act jointly in this direction can be incorporated in wage agreements. But the Krug-Lewis agreement went even farther and made a long and detailed safety code a part of the contract, along with certain other rather drastic provisions and penalties.

At a quick glance, these might also seem proper matters for a contract. Analysis shows, however, several grave objections. Penalty and discretionary provisions invite arbitrary action and could lead to endless controversy if they were carried forward. Equally, if not more important, codifying safety measures in a wage contract results in a rigidity and a limitation that tends to defeat the avowed ends.

First and foremost, by specifying that certain things be done, it tends to prevent action beyond that specified, thus limiting safety work solely to that outlined in the contract. Second, because a rigid code takes no account of variations in natural conditions that make certain provisions inapplicable or even dangerous in certain mines and certain areas, it is an invitation to violations in addition to offering the possibility of strife and controversy in interpretation of a multitude of highly technical provisions. Third, it removes the incentive to individual effort, since the code is rigid, comes down from on high and is mandatory to its last punctuation mark. Fourth, the code fails to make clear the responsibility of the miner. Without that help, no safety program can possibly succeed as it should.

The Welfare Problem

It is even harder to stretch wages, hours and working conditions to cover "health and welfare" as used in the Krug-Lewis agreement. Health and welfare is no simple subject and involves grave questions as to how far the individual should go in relinquishing his personal responsibility for his own and his family's welfare to others. Basically, the most important step toward a better living for the worker and his family is good earnings, which the coal industry affords in full measure. How far beyond that the employer should be required to go and how much jurisdiction over his personal fortunes the worker should yield to others are questions of real importance. Quite evidently, the complete answers cannot be given in a few phrases in a wage contract, even if it were agreed that such matters properly belonged in such contracts.

Attempts to expand contracts to include these and other matters of a like or similar nature are another byproduct of distortion and misunderstanding of the principles and objectives of organization and collective bargaining. This is not to infer that the operator has no interest in or can afford to ignore these and other subjects affecting relations with his workers. Anything he can properly do to assure a happier, healthier, more cooperative working force will tend to raise productive efficiency, cut cost and better enable his organization to satisfy its customers and thus provide a fair return on investment, along with better working and earnings opportunities for employees.

Field for Joint Effort

Analysis of the situation leads to the tentative if not firm conclusion that promotion of safety, health and welfare should be the objectives of concerted effort by all parties concerned—operators, miners and state and federal authorities having jurisdiction. This would get away from the problem of having to consider such matters in formulating and administering wage agreements and would supply the flexibility and inventive no contract provision ever could. Joint effort, as indicated, would yield the maximum in results but there is good reason, in view of the fact that the public tends to hold employers at least partly responsible for progress in these directions, why the operators should get together to develop their own program and an organization for carrying it out—if possible, in cooperation with others involved or interested, but by themselves if necessary.

Much more could be said about contracts, how they should be drawn and what should go into them, including the necessity of reinforcing responsibility for carrying them out by appropriate penalties for violations by either party. Over all, however, the special factors in the coal situation make dealing with organized workers more desirable than not and make an unbroken chain of contracts, properly drawn, essential.

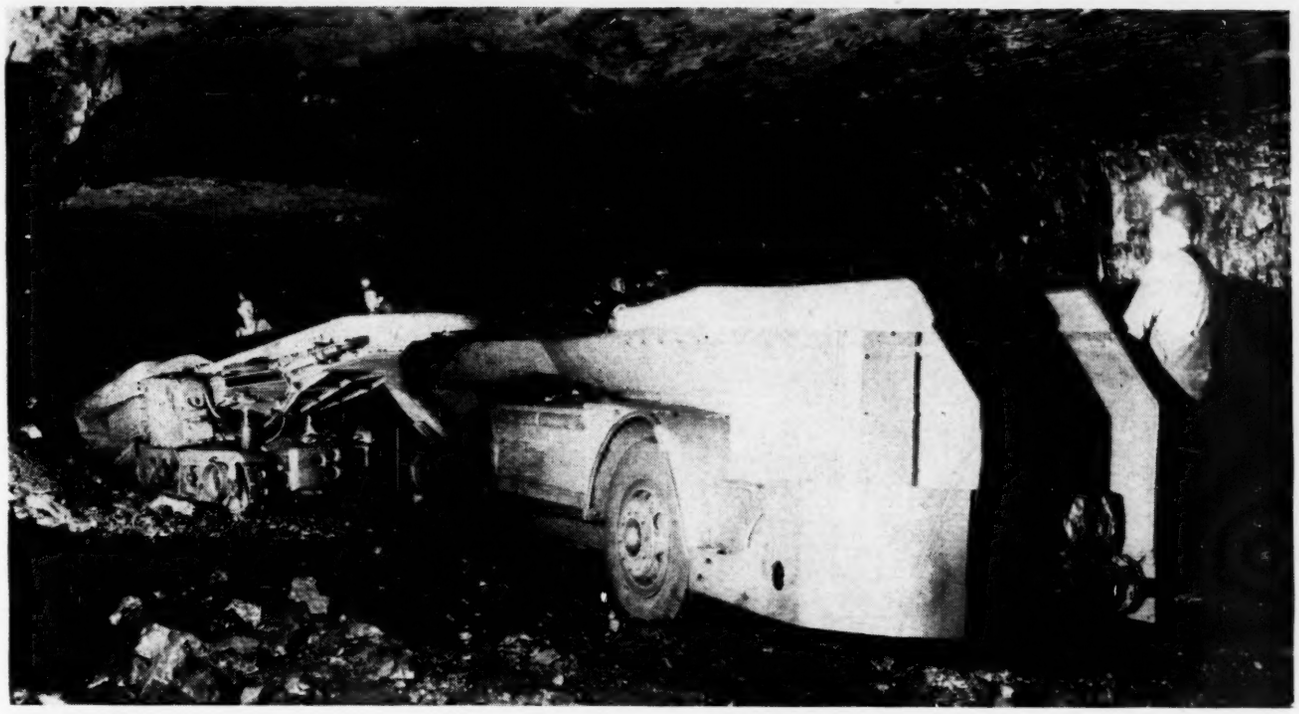
Fundamental Factors

In the coal industry, in spite of past trouble, distortion of objectives, lack of understanding and government intervention, resulting in another collapse of relations in 1946, re-examination of the fundamentals shows that operators need the union, the union needs the operators and both need the public. Past difficulties have obscured, for the moment, at least, the benefits possible through mutual cooperation between organized operators and organized miners, not only in the field of wage-cost stabilization but in joint effort toward higher efficiency, higher quality, greater safety, a better living for the miner and his family and a better return for the operator—all through better service to the public by the industry.

The opportunity still remains. Taking advantage of it, and thereby eliminating work stoppages, winning favor with the public, making government intervention unnecessary and building a sounder foundation for future progress, requires little new in principles. Rather, the evidence indicates, it turns on the following:

1. Re-acceptance of the fundamental principles and objectives of organization and cooperative action as a means of promoting sound industrial relations and sound industrial progress.

2. Reason and statesmanship on all sides in the settlement of issues and the negotiation of contracts that are formal evidence of achievement in advancing the interests of the public and thereby the interests of the miner and the operator.



With modern equipment such as this, Monarch officials have revised mining plans for maximum efficiency and recovery.

HIGHER RECOVERY

Follows Change in Monarch Mining Plan

Change to Sub-Entries and Short Rooms Increases Recovery From 50 to 65 Percent in the Panel—High Efficiency Obtained With Loaders and Shuttle Cars Despite Unfavorable Roof Conditions

TO SET the stage for more efficient production and a higher extraction, the Sheridan-Wyoming Coal Co., Inc., Monarch, Wyo., has evolved a new pillar-mining plan for use with loaders and shuttle cars in its Monarch mine. The plan provides for quick extraction of small territories with a maximum of protection in the form of solid coal. It also permits sealing at any time necessary with a minimum loss of coal, provides a full complement of working places throughout the life of the panel and facilitates quick changing of trips.

Monarch mine recovers 9 to 11 ft. of the good part of the Monarch seam, running 18 to 28 ft. thick. Average dip is 2½ percent southeast. A natural parting occurs 9 to 11 ft. above the floor and the coal is taken at that point, leaving 8 to 12 in. in the bottom. That portion of the seam above the parting contains laminations and impurities which make it unfit for mining. Cover over the working areas consists of shales and runs 400 to 600 ft. on the average. The impure top coal, as well as the shale just above, is weak in nature and in some areas, particularly where water is encountered, caves high, even falling out around posts and headers and leaving them standing. Fortunately, however, this condition is not so pronounced over the majority of the property and the top stays well enough to permit mining before too much trouble is encountered.

In line with the company's policy of constant improvement in equipment and methods, Monarch mine was mechanized in 1940 with Joy 11BU loaders, Sullivan 7B shortwalls with 9½-ft. bars (Bowdil bits), Joy T-1 crawler trucks, Sullivan CD-16 rubber-tired drills, Joy 60-D 10-ton shuttle cars and Joy PLE elevating conveyors. Section facilities also include a battery charger, crane and air compressor. The shuttle cars are powered with 400-amp.-hr. Exide-Ironclad batteries, which are being replaced this year after over 60 months of service. Spare batteries permit changing at the mid-shift period and provide a fresh charge for handling the heavy loads encountered, not only from the high capacity of the cars but also from the necessary pulling up the 2½-percent grade where circumstances, such as developing and working down the pitch, require it. Trips are changed and moved past the loading elevator by two gathering locomotives.

When the shuttle cars were installed, the working plans shown in

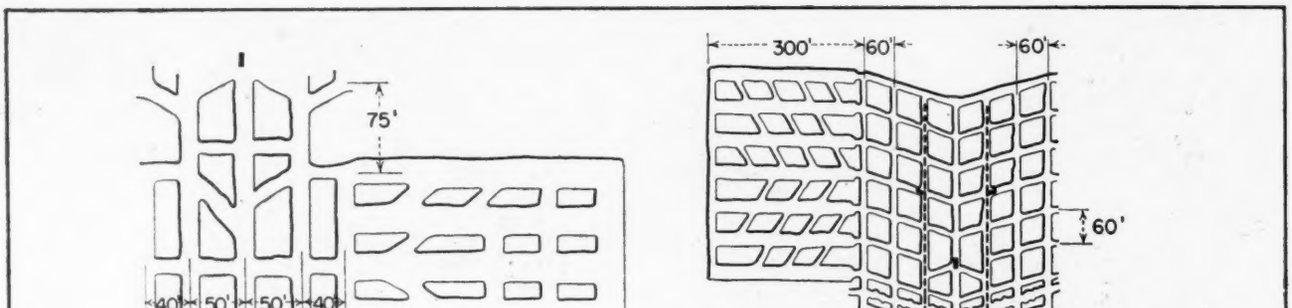


Fig. 1—The original shuttle-car mining plans at Monarch.

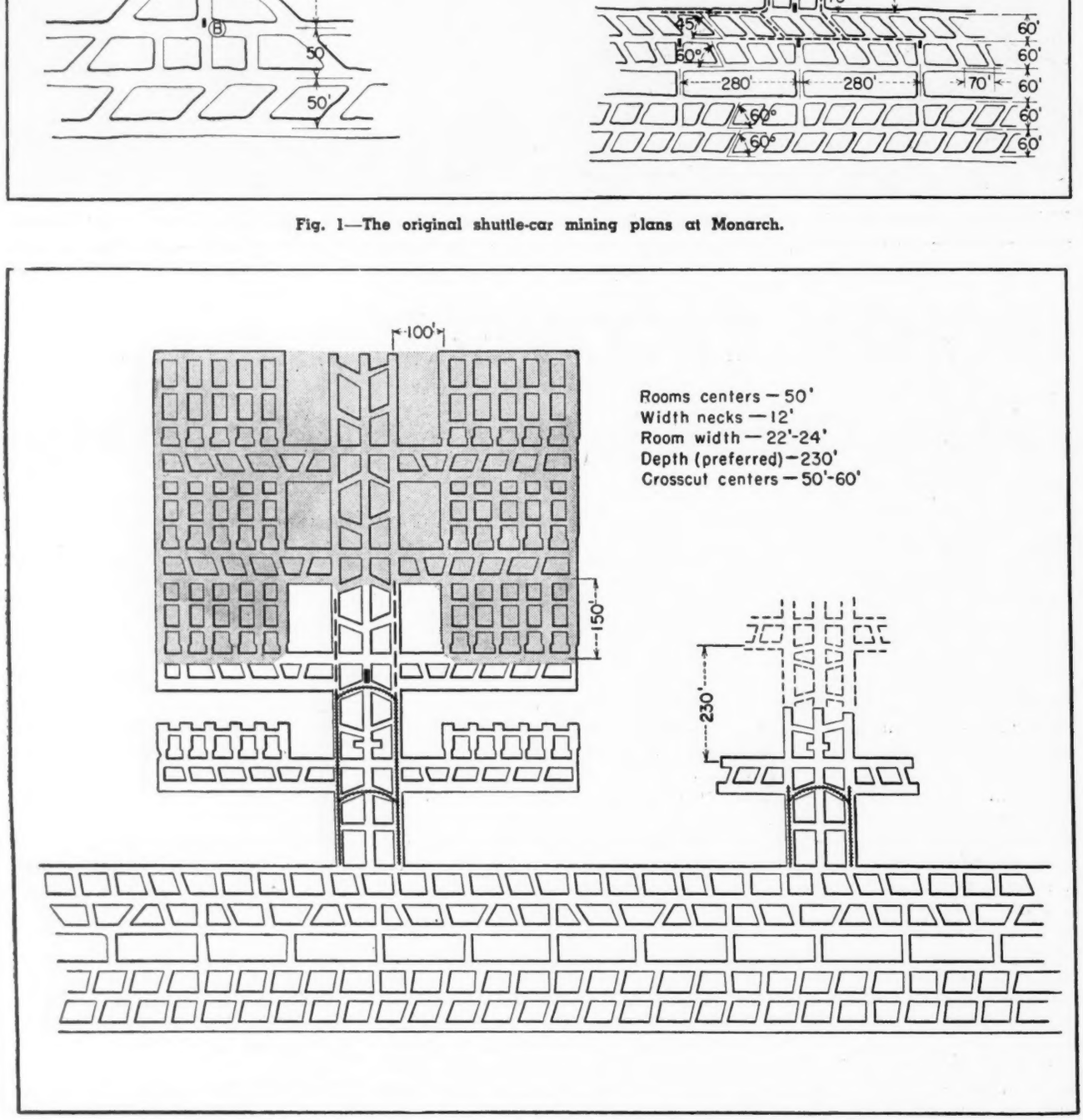


Fig. 2—Present mining plan employed at Monarch to increase recovery was instituted in 1943. Panels are turned both up and down the pitch from the mains, and as a result, as much as half the entry driving and facilities such as track and wire are saved.

Fig. 1 were adopted in succession. The major reason for changing to the present plan was difficulty in getting the desired percentage of recovery with the plan previously employed. With the new plan the average is 65 percent within the panel, whereas the average with the old was 50 percent.

Entry Driving Cut

The new mining system, shown in Fig. 2, was installed in 1943. Under it, to save entry driving, panels are turned both up and down the pitch from the mains. Thus, depending on panel length and other pertinent factors, as much as half the entry driving and other facilities, such as track, wire and the like, are saved.

Panels are opened by three-heading entries turned, as stated, both ways from the mains. Headings are 12 ft. wide on 60-ft. centers. A 150-ft. barrier is left along the main. Since the reduced number of places during this stage is a bottleneck, and since it is considered desirable to have sections ready to go when winter demand picks up, the practice now is to develop panels in advance up to and including starting the first right and left sub-entries, as shown in Fig. 2. This provides sufficient places for full output when a production machine moves in. The production machine continues to drive the panel entry, turning subs and advancing them as necessary to insure maintenance of a full complement of working places. Thus, the production machine, while completing development of a territory, is never short of working places and is able to maintain its output during the development period.

The number of sub-entries on a side in a panel varies, ranging from a minimum of three to a maximum of six. As will be noted in Fig. 2, the distance between subs fixes the length of the rooms. The management has experimented with room lengths ranging from 150 to 300 ft. and is now of the opinion that 230 ft. gives the best results. When the panel entry reaches the point where the last rooms are to be worked, the last sub-entries are turned and the sub on the side selected for room work is driven out while the panel headings are being completed. The practice is to work the rooms and take the pillars on one side, then switch over to the opposite side and, finally, mine the barriers and chain pillars in the center before dropping back to repeat with the next set of subs.

Six rooms on 50-ft. centers comprise a working territory. The first is turned 100 ft. out from the panel

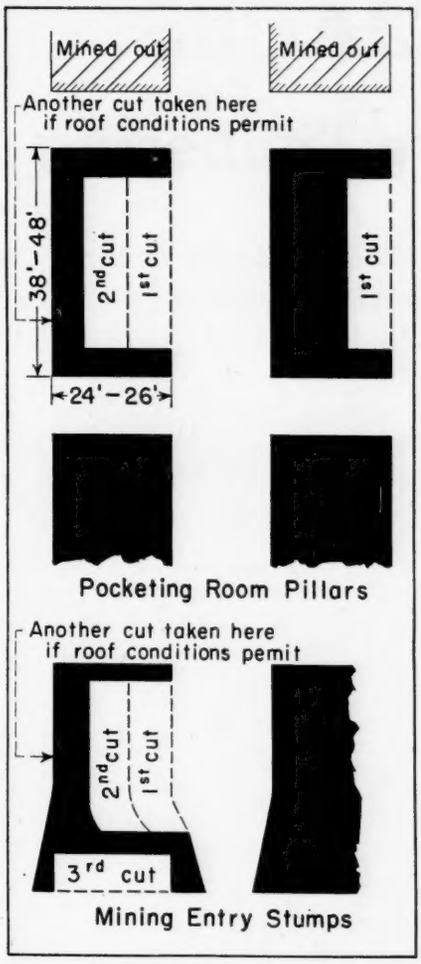


Fig. 3—Pillar-mining systems used at Monarch—top, recovery of regular room pillars by pocketing; bottom, mining stumps by pocketing two ways.

heading to establish a barrier approximately 80 ft. thick along the panel entry. Rooms are necked about 12 ft. wide for about 20 ft., or two cuts, and then are widened to 22 to 24 ft. All six rooms in a group are driven abreast. Crosscuts are made at 50- to 60-ft. intervals, leaving pillars approximately 26 to 28 ft. wide and 38 to 48 ft. long for subsequent extraction.

Wide Pockets Driven in Pillars

Removal of the pillars starts as soon as the rooms are driven up. After the last inby sub-entries are worked, mining then includes the chain pillars in the previous subs. In taking a pillar, the usual practice is to drive a wide pocket as indicated in Fig. 3. This is done by making two to three cuts, each about 30 to 40 ft. long, depending on the length of the pillar, the objective being to reduce the remainder of the pillar to a thin, three-sided fender 6 to 8 ft. wide, which is left to crush as the place takes weight.

Pillars, or stumps, next to the sub-entry are an exception to the usual rule in pillaring. These are recovered by pocketing, as indicated in the second part of Fig. 3, in a manner similar to that used in recovering a regular pillar, except that a third cut is taken in the stump from the entry side. In general, the top begins to break when the room pillars have been brought back about 100 ft. When a room group is completed, the area caves solid.

Barriers along the panel entry are mined, along with the chain pillars, after the rooms on both sides are completed. To take the barriers, they are split by rooms 22 ft. wide on 40-ft. centers, leaving pillars 10 ft. narrower than in regular room work. Otherwise, pillaring methods are substantially similar. When a panel is completed, the three headings at the mouth are immediately sealed. Sealing also can be done, if required, at any point within the panel in case of trouble.

Track Is Looped

To serve a panel with cars, track is laid in both the right and left headings and is connected by loops at each sub-entry location, as indicated in Fig. 2. The elevators transferring the coal into the cars are set in the center openings, where they feed onto the center of the loop. Trips of cars are pushed in by a gathering locomotive, which spots them during loading and then pushes them on around the loop and down to the main entry, where the trip is pulled out to the parting. In all these operations the first locomotive is followed around by the second, thus insuring continuous car service. Under the new panel plan, incidentally, the maximum shuttle-car haul with 200-ft. rooms is about 650 ft., while the average in room work is 400 to 450 ft.

The coal is broken down with Cardox 231-130 tubes. Average number per room, making about 70 tons per fall, is 8 to 9.

With crews of 18 men, average production per loading unit is 650 tons per shift. Average output per man—all men on the payroll—was 12.86 tons in 1944 and 13.40 tons in 1945. Monarch mine won "Coal-for-Victory" awards in both 1944 and 1945, along with the company's Kirby mine in 1945. Company and Monarch mine officials include D. H. Pape, president; C. M. Shott, vice president; J. P. Bowen, assistant to president; De Jack Vittitow, general superintendent; S. E. Upton, mine foreman; Stanley Laya, assistant mine foreman; A. K. Perry, master mechanic; and John Peperakis, mining engineer.

PINS AND JACKS

Facilitate Face Timbering at Arkwright

Pins in Rib Holes Made by Drilling Crew Serve as Rests for Screw Jacks Supporting Crossbars at the Face—Safety in Face Timbering Enhanced—Timbering and Clean-up Speeded up and Timber Cost Cut

By FRANK H. BROOKS
Superintendent, Arkwright Mine, Consolidation Coal Co. (W. Va.), Morgantown, W. Va.

Close-up of screw jack resting on pin in hole in the rib. The ball-and-socket head permits setting the jack at an angle with safety.

SHORT screw-type jacks on steel pins are being used for face timbering at the Arkwright mine of Consolidation Coal Co. (W. Va.), Morgantown, W. Va. Some 7 ft. of the Pittsburgh seam is being mined, leaving about 8 to 12 in. of roof coal, which is high in sulphur and ash. Immediately above the roof coal is 1 to 3 ft. of drawslate and above that is 8 to 12 in. of "wild" coal. From the "wild" coal to hard black rock the strata comprises 2 ft. of gray fireclay.

Eight parallel headings on 45-ft. centers are being mined, with breakthroughs on 90-ft. centers on a 72-deg. angle, using track-mounted cutting, loading and haulage equipment.

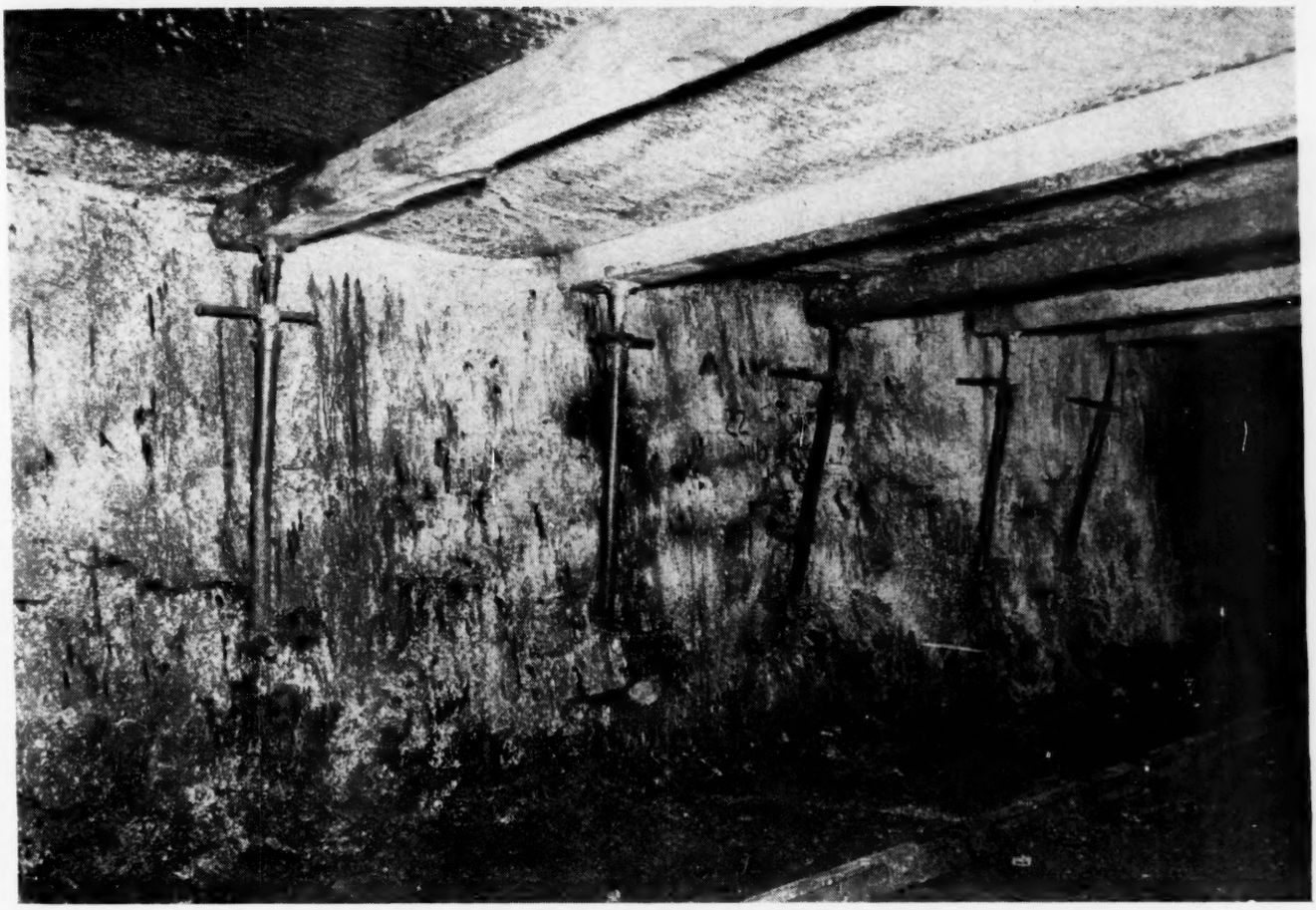
In the recently adopted face-timbering system, with crossbars supported on steel screw jacks set on pins, holes for the pins are drilled on 4-ft. centers 2 ft. from the bottom by the drill crew, which also handles face drilling for shot holes. The steel pins, 1½-in. in diameter and 18 in. long, are placed in the holes so that they protrude 3 to 4 in. from the rib. The pins serve as seats for the steel jacks and transfer the load to the rib.

The steel jacks are of the screw-type steel safety-jack type 36 in. long, with 12-in. sliding handles and ball-socket-type heads, which permit setting the jacks at an angle with safety. The body of the jack is standard 2-in. round black pipe with a supporting capacity of approximately 8 tons. Maintenance costs are kept at a minimum on repairs to these jacks because of the easy replacement of the 2-in. pipe, which usually is available around the mine. The base of the jack consists of a "Y," or fork-type, plate which rests on the pin.

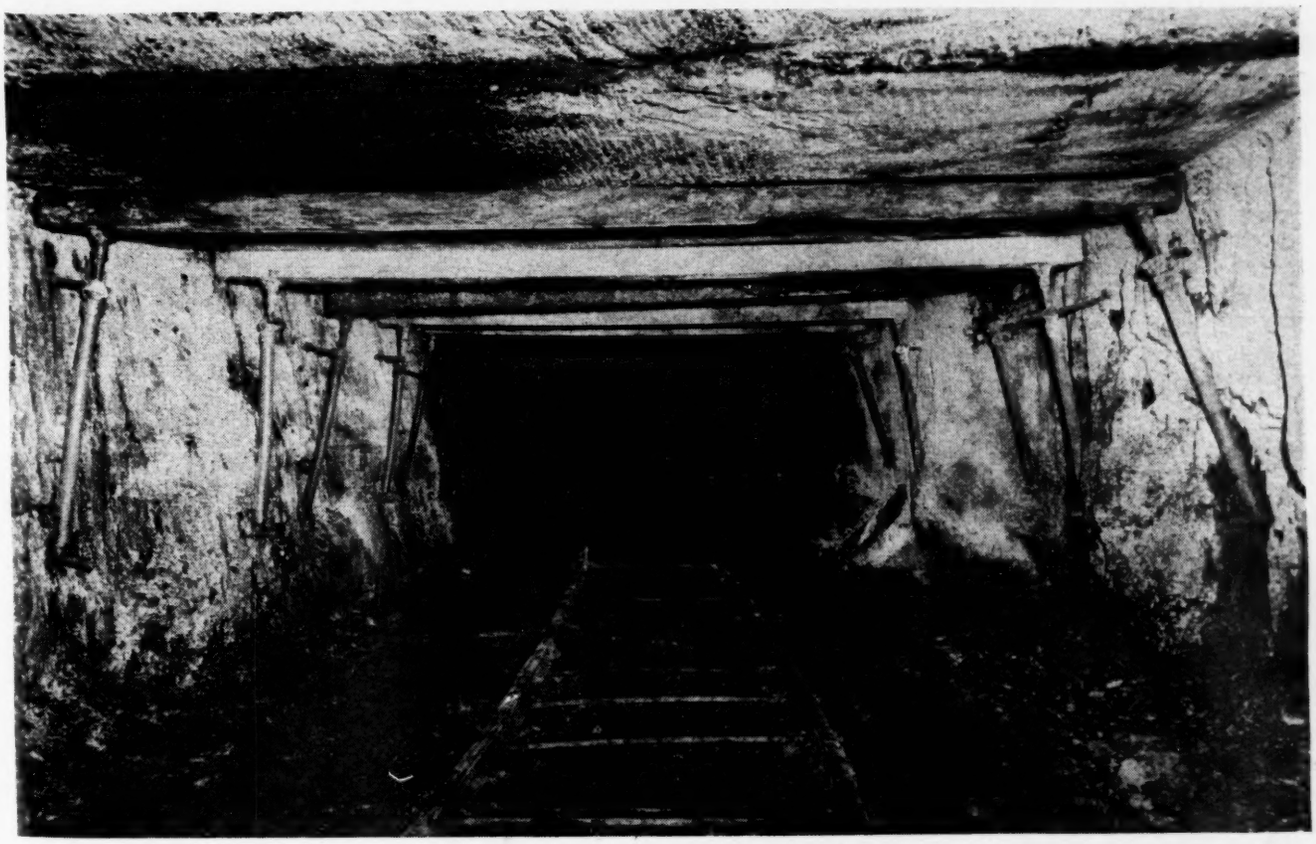
The mine at present is using 5x7-in. crossbars 14 ft. long, which are supported by the jacks resting firmly on the pins. A minimum of five crossbars are carried in each working place. These crossbars are set on 4-ft. centers to afford ample roof support and safety for machine operators and other workmen during the preparation and loading cycle in each place. This requires ten steel jacks and pins in addition to the five wood crossbars for each working place.

This pin timbering plan has resulted in a definite saving in the time required for the timbering cycle. The mine also is getting better results in the face clean-up, as a result of the pins being set 2 ft. from the bottom, thus allowing the machine to operate freely along the ribs without danger of knocking posts. This results in a faster loading operation and a more satisfactory clean-up. A definite saving in posts and other timbering materials also has been noted.

[Note by the editors: In addition to the jack-type method here described by Mr. Brooks, other operators in the same area are drilling holes near the top and inserting pins with saddles on the outer ends, on which the crossbars are laid.]



Five jacks in place along one rib supporting the ends of five wood crossbars.



Working place timbered with 5x7-in. crossbars 14 ft. long supported by pins on jacks in rib holes. The place is now ready for preparation and loading.

MODERN LUBRICATION

Assures Higher Production at Lower Cost

Careful Lubricant Selection and Proper Application the Keys to Low Maintenance, Economy and Higher Output—Centralized Systems Provide the Maximum Results With Greater Convenience and Safety

By M. B. LAWTON
Lincoln Engineering Co.
St. Louis, Mo.

NO WIZARD is necessary to squirt oil or squeeze grease into a bearing. However, it does require some knowledge and experience to determine the type of lubricant that should be used, how much is needed and how often it should be applied. Year after year, thousands of dollars are squandered in lost production time, parts replacement, maintenance overhead, employee accidents and decreased machinery efficiency through faulty lubrication of equipment used in coal mining. These facts have been established by alert operators who, following analysis of their carefully kept records on maintenance overhead and realization of excessive production costs per ton these figures represented, decided to take steps toward reduction and possible elimination of these unnecessary costs.

Many of these operators have effected considerable savings through increased production with greatly reduced maintenance costs by taking the following two important—although simple—steps:

1. Selecting lubricants carefully.
2. Providing for proper and economical application of these lubricants.

Lubricant Selection

Modern machinery is designed for high-speed operation, and, since bearing clearances are governed by operating speeds, lighter-grade products for better lubrication are more in demand. However, these lubricants should have sufficient adhesiveness to cling to surfaces and not be thrown off by centrifugal force or normal wiping action in operation.

A number of manufacturers devote their entire energies and facilities to the exclusive production of lubricants and their byproducts. Some have greatly contributed to the simplification and standardization of lubricants through constant research and development of fewer and finer products to meet a variety of industrial needs. This standardization has, in many instances, enabled one lubricant to do a better job than the three or four different types formerly used. In addition, it has meant considerable savings to the user by facilitating quantity purchases of one product at a lower cost, reducing waste and contamination resulting from the use of numerous lubricant containers instead of one, eliminating much of the guess work on the part of the oiler as to which lubricant should go where, and facilitating standardization of lubricating equipment by cutting down the number of devices and methods formerly employed in using several lubricants.

The initial step in analyzing lubrication problems in the coal industry is to determine how the many products now in use can be whittled down to a minimum while still attaining equal or better results. The lubrication engineers representing reputable manufacturers of industrial lubricants can render valuable assistance in solving such problems. Many had their first practical experience with the desirability and success of lubricant standardization during the war, when factors such as transportation, storage-container shortages, limited production facilities and, above all, the problem of educating inexperienced field personnel in correct application of lubricants to all

Fig. 1—Early method of lubricating mine-car wheels.

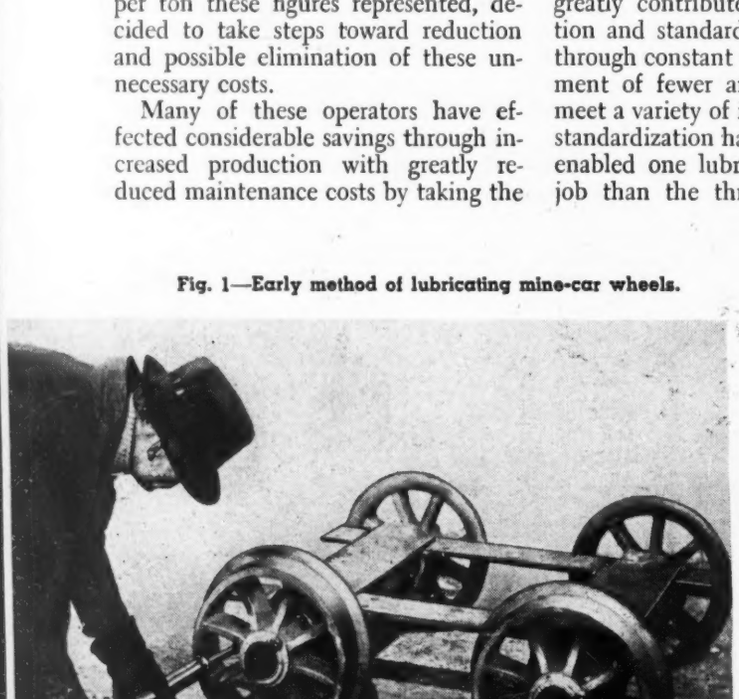
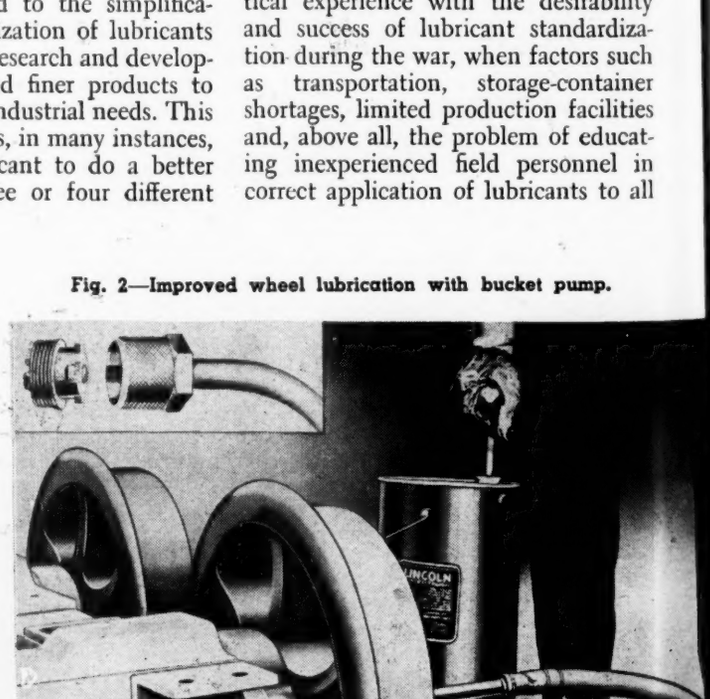


Fig. 2—Improved wheel lubrication with bucket pump.



types of essential equipment necessitated reduction in types and numbers of products to a bare minimum. The experience and know-how acquired during that period is now available to industry.

Engineers of reputable manufacturers are eager to assist in solving lubricant problems and recommending the proper types and grades to meet every challenge. Progressive coal operators are helping themselves by seeking out the men who can render service and assistance from a practical and test-proving standpoint and by avoiding those who merely confuse by exaggerated and unsupported claims for their products.

Lubricant Application

In analyzing lubricant-application methods, it is well to remember that the lubricant should enter, whenever possible, at the point of maximum clearance between the shaft and the bearing. Otherwise, the flow and distribution to the vital area are greatly restricted. The incorrect application of lubricants, even though the products be the finest that money can buy, may give results no better than those obtained years ago by smearing any old grease on the axle or shaft with a paddle or brush. In other words, the finest lubricant obtainable depends for its results on the manner in which it is applied.

Astounding progress has been made in coal production methods and equipment in recent years. The lubricating equipment industry has kept step and methods available today are far superior to those used some years ago. For instance, Fig. 1 illustrates the method of mine-car lubrication used before 1920. Pipe plugs had to be removed from the wheels or axles and the lubricant forced into a reservoir by a suction gun which, due to the suction method of filling, was limited to light, fluid-type lubricants and resulted in a slow, tedious job plus considerable waste.

An improvement resulted from the introduction of the mine-car "grease plug" and "lock-on" type adapter (Fig. 2), which permitted replacement of the suction gun by the bucket pump. The plug had a spring-actuated ball check that opened to permit entrance of lubricant and remained securely closed against dirt and grit while the mine car was in use.

By coincidence, the coal-mining industry is responsible, to a great degree, for modern types of power-operated lubricating equipment. It was the need for a better and faster method of lubricating mine-car trucks that prompted a wheel manufacturer to design and build, in 1923, the first automatic air-operated remotely controlled lubricant pump. This unit (Fig. 3) had two supply tanks, each holding 500 lb. of grease. Air pressure was applied on top of the lubricant in each tank to prime the automatic air-operated metering pump, which was controlled in operation by manipulating the control, or outlet, valve on the end of the flexible hose. This method of dispensing lubricant in volume and under pressure permitted lubrication of mine cars by from one to four men simultaneously. Consequently, it was an important forward step in lubrication, speeding up operation, with consequent saving in man hours, eliminating lubricant waste, and preventing lubricant contamination.

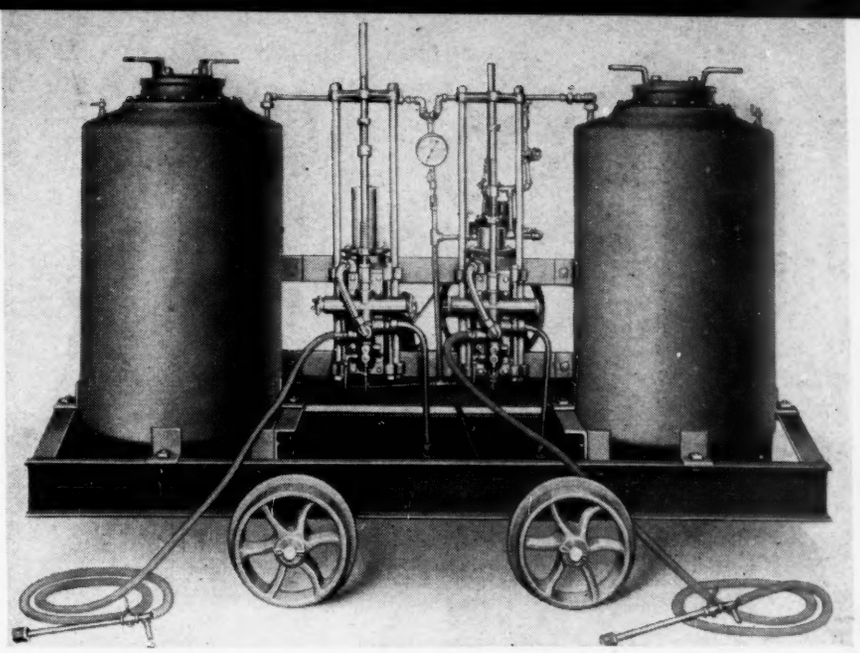


Fig. 3—First automatic air-operated remotely controlled lubricant pump.

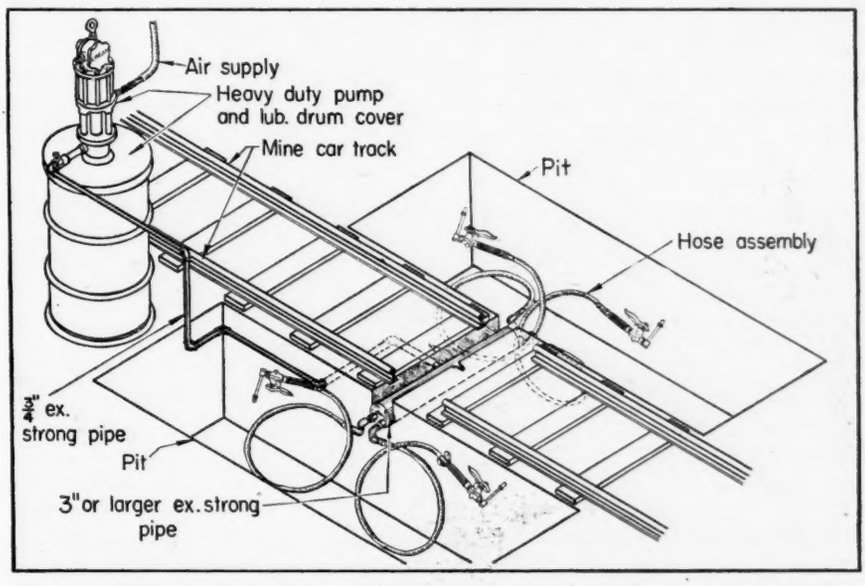


Fig. 4—Layout for lubricating mine-car wheels with heavy-duty air-operated unit providing increased flexibility in operation.

These savings have been enhanced by the more recent development of air-operated pumps built on the same principle but which dispense lubricants from original refinery containers holding 55 gal. or 400 lb. The heavy-duty air-operated unit shown in Fig. 4 provides considerable flexibility in that lubricant pressures ranging from 6 to 80 times the air pressure are developed and lubricant outputs up to 18 lb. per minute for SAE 90 gear oil and 9 lb. for cup grease are obtainable. This permits lubrication of as many as 400 to 600 mine cars in an eight-hour shift with minimum man-power and no waste of lubricant. Fig. 4 also illustrates the correct layout and proper pipe sizes for setting up a central sta-

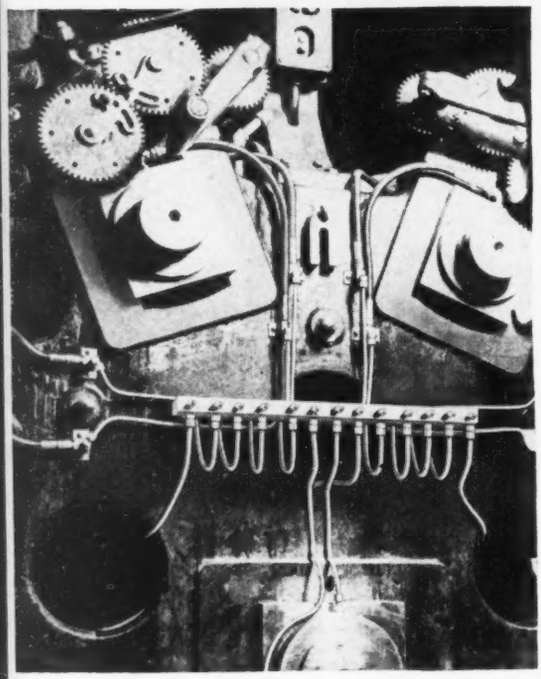


Fig. 5—Grouping of fittings in header blocks and use of tubing, pipe or flexible hose for greater safety in lubrication.

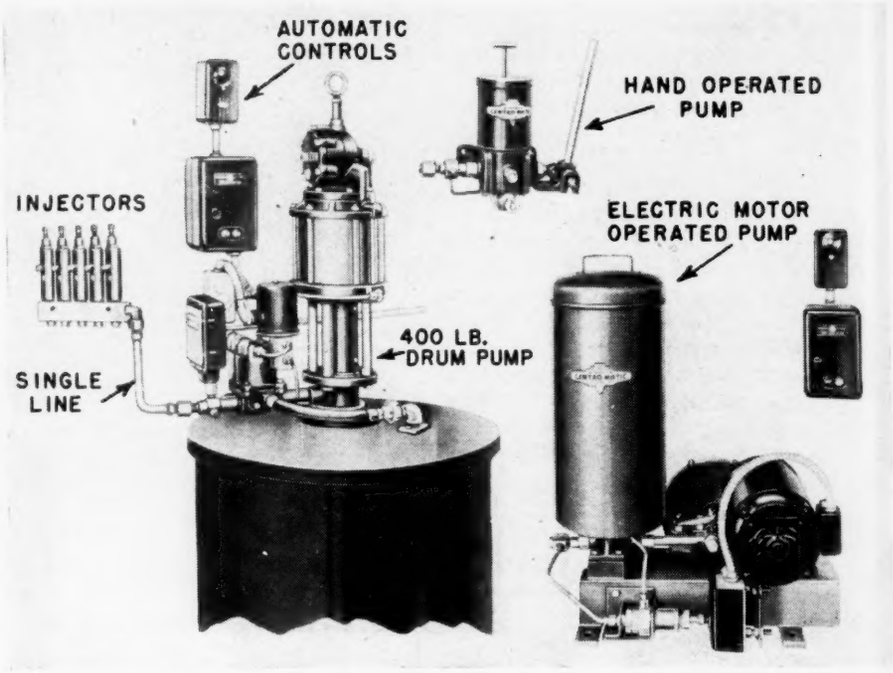
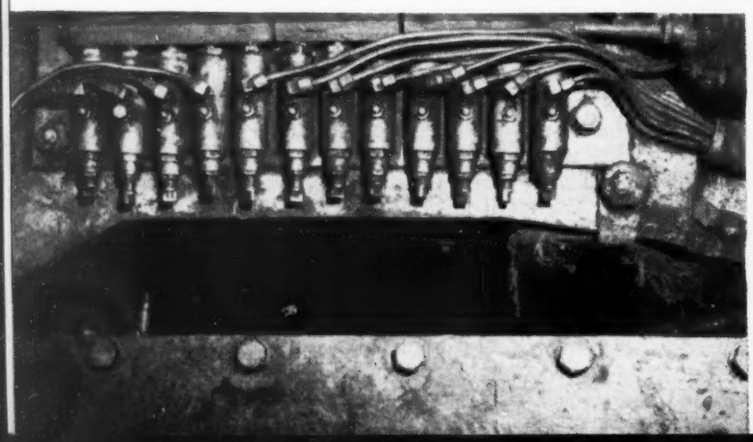


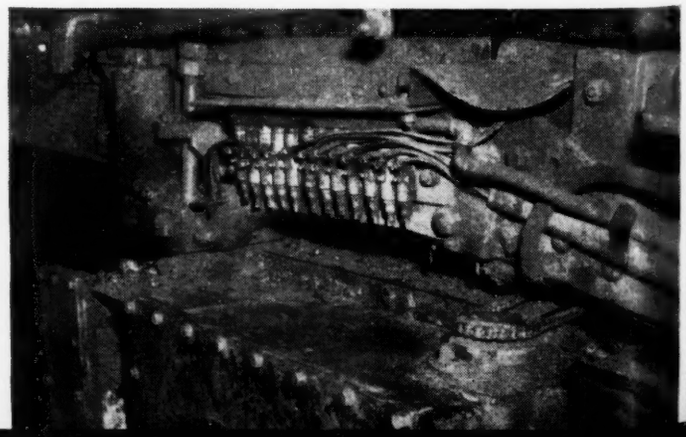
Fig. 6—Manual, air and electrically operated dispensing units or pumps employed in the most widely used centralized lubricating systems. In addition, pumping units powered by direct drive from the machines to which they are attached are available.

Fig. 7—Application of centralized system to the lubrication of a coal-loading machine.

tion for mine-car lubrication. The 3-in.-diameter pipe beneath the tracks assures a constant supply of lubricant to all operators on an equal basis.

While the improvements in mine-car lubrication were taking place, methods of servicing other coal-mining equipment, such as cleaning plants, shovels, loading machines, conveyors and locomotives, were receiving considerable attention. Introduction of high-pressure grease fittings and high-pressure hand-operated guns provided effective flushing of bearings plus positive application of fresh, clean lubricant. This simplified the oiler's job and resulted in a substantial saving in both labor and lubricant over the old-style grease and oil-cup methods. Better and more economical methods of transferring lubricant from original refinery containers to filler pumps and





to hand guns were likewise developed and adopted.

When high-pressure lubrication fittings first came into use on coal-mining equipment, they customarily were mounted at the bearing inlet. It was soon realized, however, that this made it necessary to shut down the machine during lubrication to avoid the risk of injury in attempting to lubricate hard-to-reach bearings. This hazard was eliminated and additional time saved by grouping the fittings in header blocks at accessible locations on the machines and connecting them with the bearings by copper tubing, pipe and flexible hose, as shown in Fig. 5.

While this method permitted lubrication of machinery in operation without danger to the oiler, proper lubrication still was subject to the man's judgment and dependability. Since many of the bearings were not visible, it was more or less guesswork as to how much lubricant each bearing received. It went without saying, therefore, that some bearings were bound to be over-lubricated, others under-lubricated and still others completely overlooked. Thus, despite improvements in bearings to compensate for ever-increasing machine speeds, improper application of lubricants still resulted in excessive maintenance costs and loss of production through bearing failures.

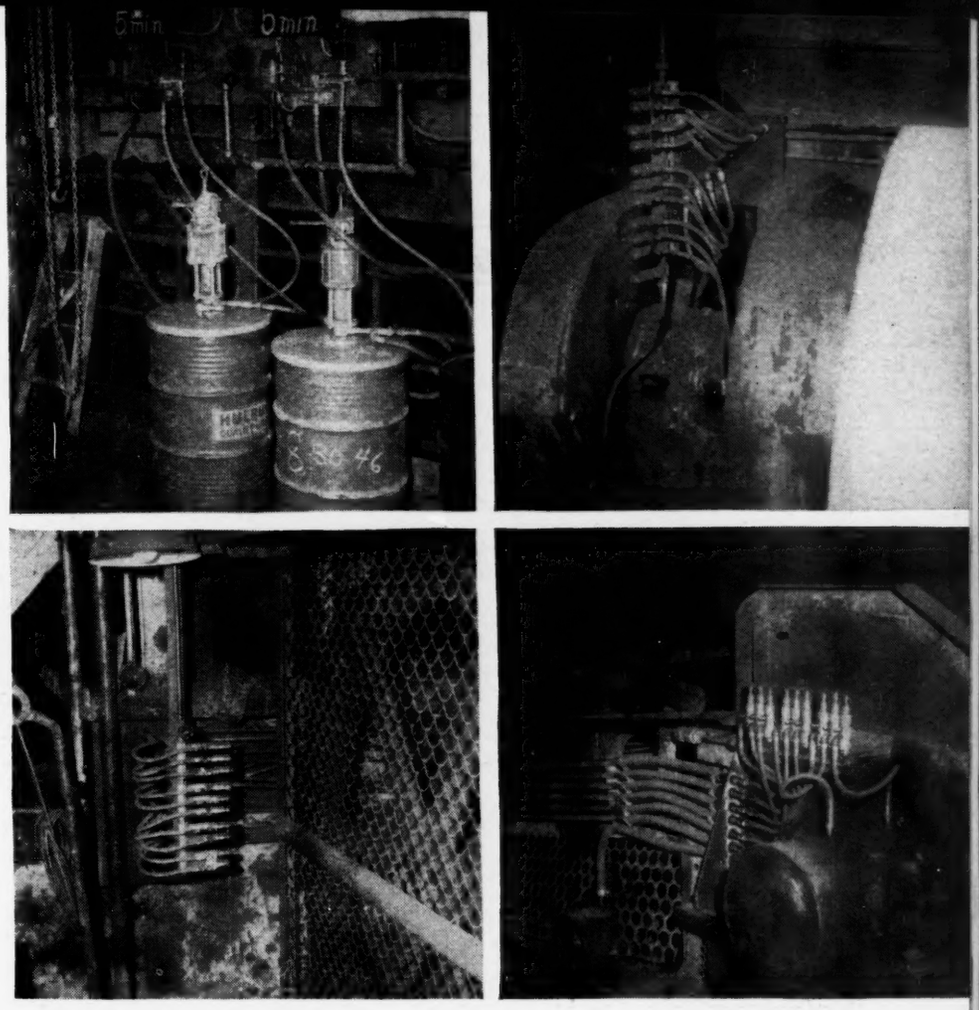


Fig. 8—Examples of the installation of centralized lubrication in a preparation plant.

Film Maintenance the Key

It has long been recognized by lubrication engineers and machine designers alike that an ever-present film of *clean* oil or grease between bearing surfaces spells well-nigh perfect lubrication. The problem has been to find a method of providing such a film and a few aggressive manufacturers of lubricating equipment undertook to find the answer. This led to the introduction of the centralized lubricating system with lubricant injectors or measuring valves to provide each bearing with a measured quantity of clean lubricant at predetermined intervals, plus a suitable pump for supplying the system.

At first, the complicated design and lack of adjustability of the various types of injectors, the special lubricant-dispensing pumps and valves needed to operate them and the devious methods of installation resulted in high cost. Continued research and development have, however, simplified and standardized design so that modern production methods can be employed in making injectors and pumps. In addition, installation costs have been greatly reduced by the elimination of unnecessary supply lines and the actual installation has been so simplified that the average industrial-plant "handyman" can quickly mount a centralized system on any machine under the supervision of a master mechanic or plant-lubrication engineer.

The most widely used centralized lubricating systems are designed for use with dispensing units or pumps (Fig. 6) operated manually, by air pressure and from original lubricant containers and by electricity. In addition, pumping units powered by direct drive from the machines to which they are attached have been introduced for certain applications. Some present-day systems operate with dual lubricant supply lines, while others (Fig. 6) operate with a single line. Both types are performing satisfactorily.

The advantages to be gained by equipping various types of machines used in the coal industry with centralized lubricating systems were quickly recognized by alert operators keeping cost figures on lubrication and on the cost of down time and repairs caused by improper application. They realized that they were dependent upon the human element to apply the proper quantity of lubricant to each bearing at the right time; that, even though the man was exceptionally reliable, performance of the job was difficult, if not impossible, with such machines as coal loaders which operate mostly in such close quarters as to defy any man to lubricate the bearings during operation; that the hazards involved in lubricating some operating bearings in a preparation plant rendered the job extremely difficult and dangerous; and that the dusty and dirty conditions under which coal-mining equipment normally operates were conducive to the application of unclean lubricants by hand methods.

The savings realized and the results obtained by equipping machines with centralized lubricating systems have far surpassed the expectations of many coal operators and their engineers. They have found that it not only permits continuous and speeded-up operation for indefinite periods with a reduced power consumption, but that bearings lubricated accurately and frequently with clean lubricant show very few signs of wear, that the human element is practically eliminated and that consumption of lubricant is sharply reduced.

Typical instances of savings and the types of coal-mining machinery involved, as reported by coal operators,

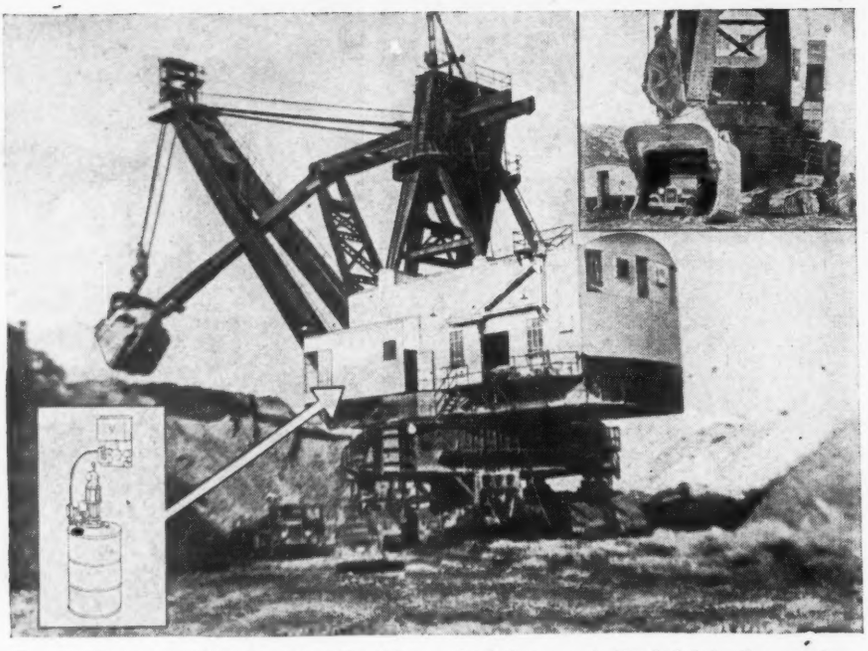


Fig. 9—Stripping shovel equipped with a single-line centralized lubricating system.

include, among others, one in which a Myers-Whaley No. 3A Automat coal loader (Fig. 7) was equipped with a single-line centralized system. It comprises 51 adjustable injectors grouped in manifold at locations permitting convenient inspection and adjustment but assuring freedom from damage. Each injector is attached to a bearing by copper tubing or, with moving or rotating shafts, by high-pressure flexible hoses and swivels. The injectors are supplied clean, screened lubricant by a grease pump with a tank capacity of approximately 22 lb. powered by direct drive off the 123 CD tramming-clutch shaft. This shaft turns up 328 r.p.m. and each bearing is lubricated every three minutes during loader operation.

The installation was made during overhaul of the loading machine in August, 1944, and is still in operation. No bearing failure has been reported due to faulty lubrication since the original installation was made and no major throuble has been encountered with the system. The loading machine operates three shifts daily, producing approximately 1,350 tons of material. During this time, 15 lb. of grease are injected through the bearings under high pressure. This quantity could, of course, be very easily reduced by simple external adjustment of the injectors, but the operators prefer to flush the bearings and thereby prevent coal dust, grit and abrasive from entering. They claim that grease is far less expensive than down time and that, furthermore, this consumption represents a considerable saving over the quantity used with former hand methods. A labor saving of two man-hours per loader per shift has also been attained.

So successful was the first centralized system of automatic lubrication that the owners have since equipped over half the loading machines and are currently changing over the remainder. In addition, they have been installing the system (Fig. 8) in one of their coal-cleaning plants.

Eccentric Life Lengthened

This plant has 457 bearings, 27 of which are on four sets of shakers. The eccentrics, crankshafts and pillow blocks of these shakers are automatically lubricated every five minutes three shifts per day and no bearing replacement or shut down as a result of faulty lubrication has been experienced since the system was installed a year ago, although over 1½ million tons of coal passed over the shakers during that time. Prior to the installation, the eccentrics, which drive three-deck shakers, generally were replaced twice a year.

Dispensing of lubricant from original 400-lb. drums and proper adjustment of the injectors have resulted in a lubricant saving of approximately 10 lb. per shift, or 30 lb. per day. Additional savings in man-hours have reduced costs by several thousand dollars per year.

The lubricant-dispensing pumps (Fig. 8) are powered by 6-in. air motors and put lubricant through the single supply lines leading to the injectors at rates of from 8 to 14 oz. per minute with air pressure of 75 to 100 lb. per square inch. The special control panels, mounted on the wall above each pump, are equipped with a time clock that can be set for operation at intervals ranging from 3 to 60 minutes, a pressure switch, a solenoid valve automatically controlling the air supply and an alarm signal giving instant warning if the air supply fails, a lubricant drum is emptied or a supply line breaks.

Some machines, such as the 11BU Joy loader have been equipped with a special type of pump to supply lubricant to the injectors. The pump is hydraulically powered and works in series with the hydraulic system operating the loader. A 3½ to 1 ratio is used and the lubricant-supply tank holds 28 lb. of grease. Since this system was installed five months ago, it has resulted in a lubricant saving of approximately 50 percent over the former hand method and has reduced labor cost one man-hour per machine per eight-hour shift. Tabulation of these savings from the first centralized installation resulted in a decision to similarly equip the remaining loaders.

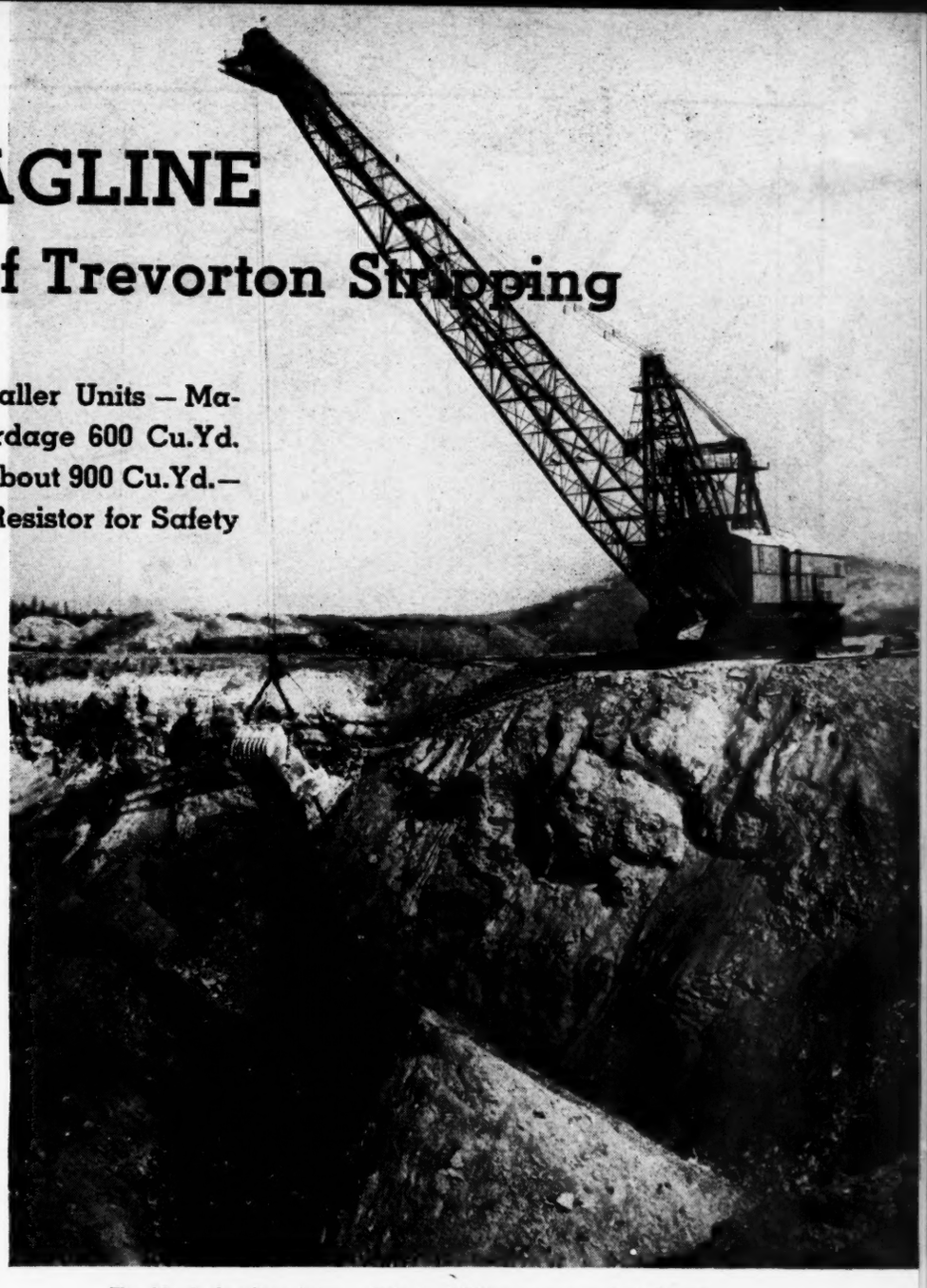
Fig. 9 shows a Marion stripping shovel equipped with a single-line centralized lubricating system. The lubricant is pumped directly from the original 400-lb. drum and the system can be operated semi-automatically by manual pushbutton control or fully automatically by time-clock control. This installation has entirely eliminated shutting down the shovel during the lubricating period and assures each bearing of a measured supply of lubricant at predetermined intervals during operation. With the former hand method, considerable damage was caused to bearings, which were overlubricated at the beginning of a shift and starved for lubricant when they were finally halted long enough to permit re-application. In addition to saving a large quantity of lubricant per shift, this system has eliminated all danger to the oiler.

Summing up, it can be said that the savings cited in the foregoing, which were derived from reports by coal-mine management, considerably reduce the production cost per ton of coal. Prolonged and economical production with modern mining machinery requires precise application of lubricants with ease and speed at predetermined intervals. The centralized lubricating system provides the answer on machinery to which it is applicable. Modern, clean methods of handling lubricants from original refinery containers with heavy-duty high-pressure lubricating guns and accessories provide the answer with other types of mining equipment, particularly mine cars.

25-YD. DRAGLINE
Extends Life of Trevorton Stripping

Dragline Replaces Three Smaller Units — Machine's Capacity in Solid Yardage 600 Cu.Yd. per hour, in Recasting Work about 900 Cu.Yd.— Unit Substation Has Ground Resistor for Safety

By RALPH R. RICHART
Associate Editor, Coal Age



The 25-yd. dragline doing a little backfilling at one end of the pit.

SUBSTANTIATING the trend toward larger stripping equipment in the anthracite region a new 25-yd. dragline has been put into service at the Trevorton stripping of the Philadelphia & Reading Coal & Iron Co., Trevorton, Zerbe Township, Northumberland County, Pa. This machine replaced three smaller draglines and is the fourth 25-yd. walking dragline to go to work in the region in the past 18 months. Four more units, all duplicates of this particular machine, are on order and will be put to work in the Western and Eastern Middle Fields.

Between Two Mountains

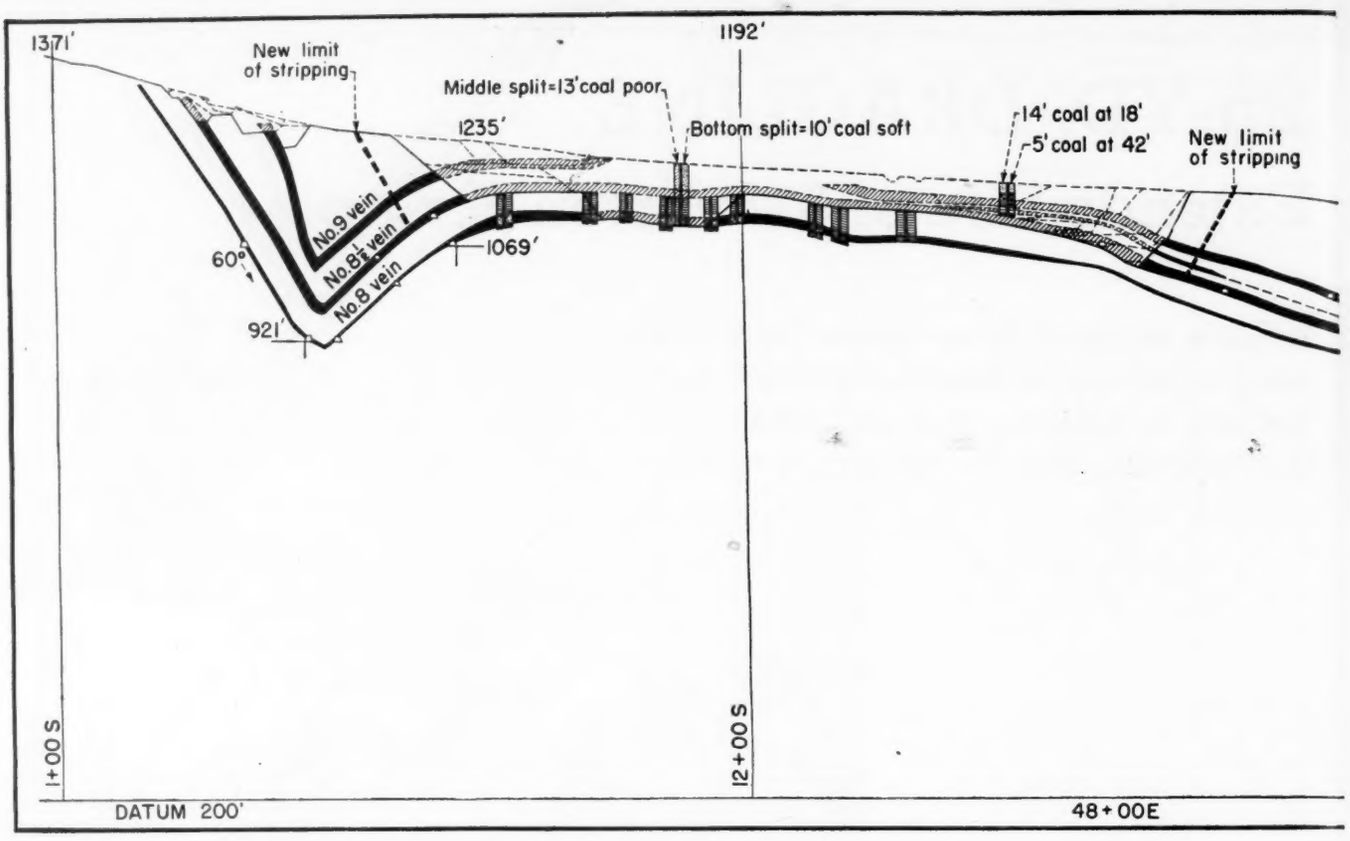
The Trevorton stripping lies south of the town and between the North and South mountains. It includes a 1¼-mile strip between the mountains and extends five miles east and west. Four veins are stripped: the Buck Mountain (No. 5), Skidmore (No. 7), three splits of the Mammoth (Nos. 8, 8½ and 9) and the Holmes (No. 10). These veins, some of which are shown in the illustration, pitch from flat to 75 deg. Besides the numerous faults, other irregularities occur along the long axis of the field so that in spite of all of the testing and prospecting the stripping operations require very close supervision. As much as 63 percent of the strippable coal in this area has been first and second mined, some of it as early as 1875. Approximately 37 percent of the strippable coal in this area is virgin coal.

The Trevorton stripping, like the Monitor stripping (*Coal Age*, December, 1945), is managed through the Dick Construction Co., Hazleton, Pa. In this instance, the P. & R. C. & I. Co. pays the contractor not for the overburden removed but on the basis of the raw coal delivered to the cleaning plant. The contract calls for stripping on a 4 to 1 ratio, i. e., 4 cu. yd. of overburden to one gross raw ton (2,240 lb.) of coal.

Since the Trevorton job was started in August, 1942, 8,292,000 cu. yd. of overburden has been moved to recover 2,446,000 gross raw tons of coal, a ratio of 3.39 to 1. However, more of the deeper work to come will raise the ratio to the 4 to 1 limit. The life of the stripping has been estimated at eight years. About 4,000 gross raw tons of coal are delivered to the breaker each day, including that recovered by H. B. Mellott and Joseph Latorre (subcontractors for the Dick Construction Co.). All coal is trucked to the nearby Stevens Coal Co. breaker by still another contractor, W. H. Thomas & Bros., Shamokin, Pa.

While this 1150-B Bucyrus-Monighan dragline is the fourth machine of the 25-yd. class in the anthracite region, it differs from the others in that its boom is 200 ft. instead of 180 ft. long and it swings a 22-yd. bucket in place of a 25-yd. one. The electrical equipment is General Electric with Amplidyne control on all three motions—drag, hoist and swing.

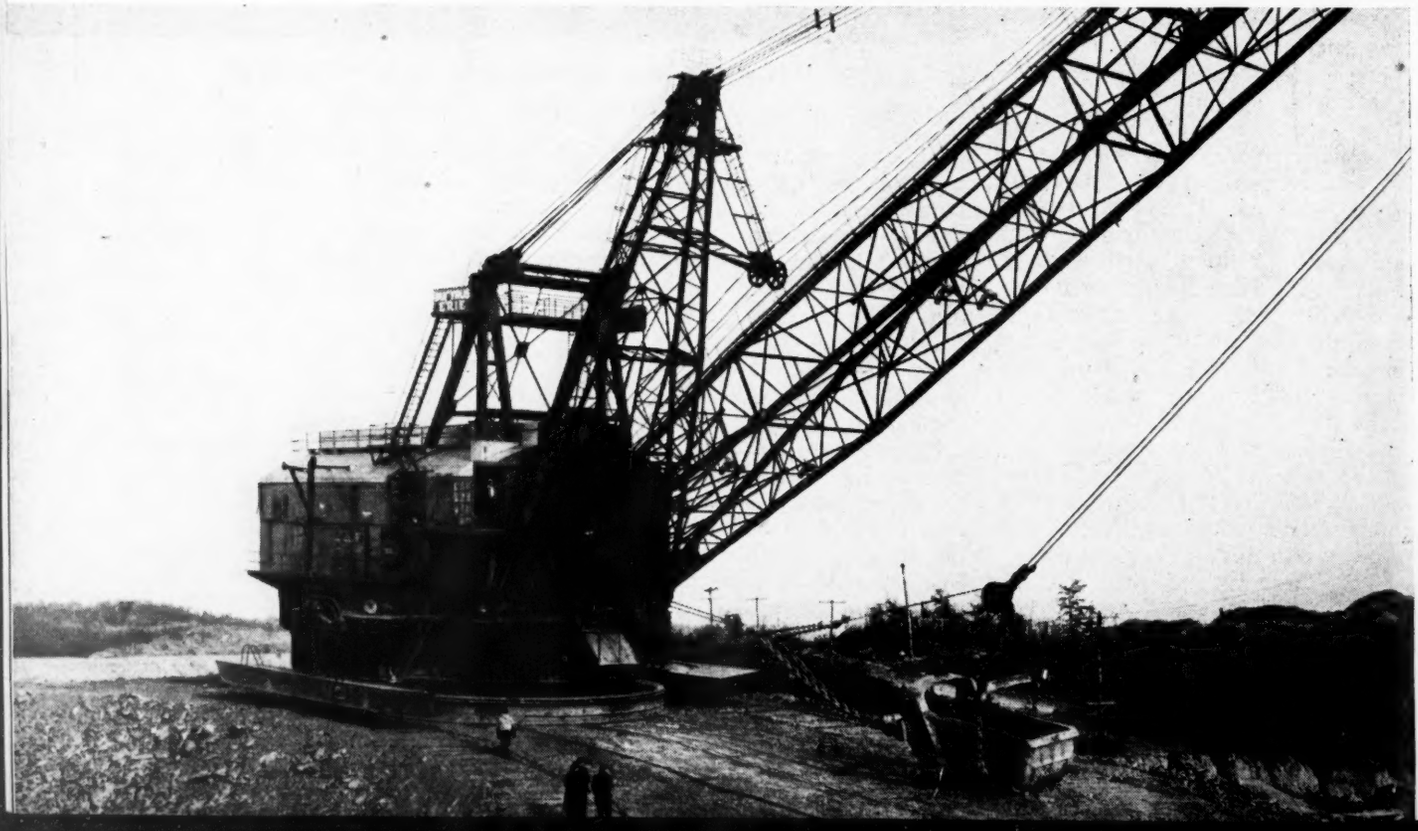
The 1150-B dragline is being used to strip to a vertical depth of 90 ft. where first and second mining has been done and up to 120 ft. in virgin coal. This is about the depth that the



8-yd. 9-W Bucyrus-Monighan, also with a 200-ft. boom, has been working. However, the 1150-B will take larger bites and—with the Amplidyne control designed to produce speedier automatic acceleration and deceleration and reduce stress on pinions and strain on the front end—will operate on a faster cycle. For example, the time of a cycle for a 120-deg. swing has been clocked at 55 sec.

In solid yardage the capacity of the machine on this job is about 600 cu. yd. per hour and in recasting work, about 900 cu. yd. The divider rock separating the three splits of the Mammoth vein runs as much as 14 ft. This divider rock is loaded into 1-TD Euclids with small draglines or shovels and hauled out of the pit. Other than the hauling of the divider rock this stripping job is 90 percent casting, with some recasting involved in a few places. About two years of work lies

A truck road gap had to be filled to provide a crossing for the dragline.



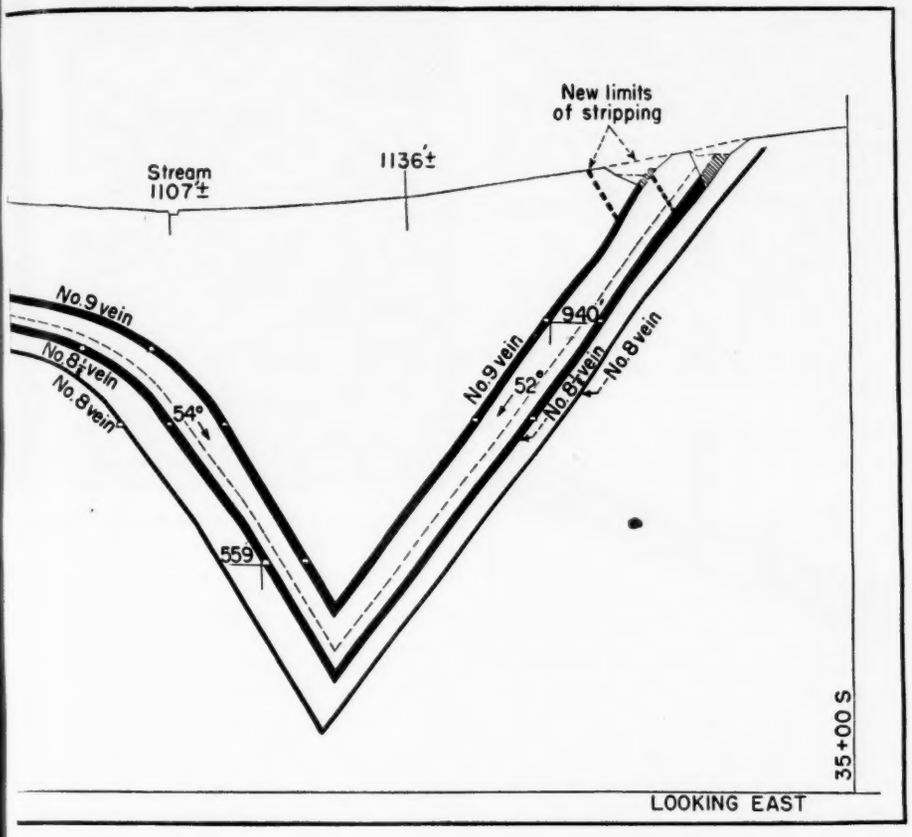


Fig. 1—The dotted lines show how much more territory will be stripped by the 25-yd. dragline.

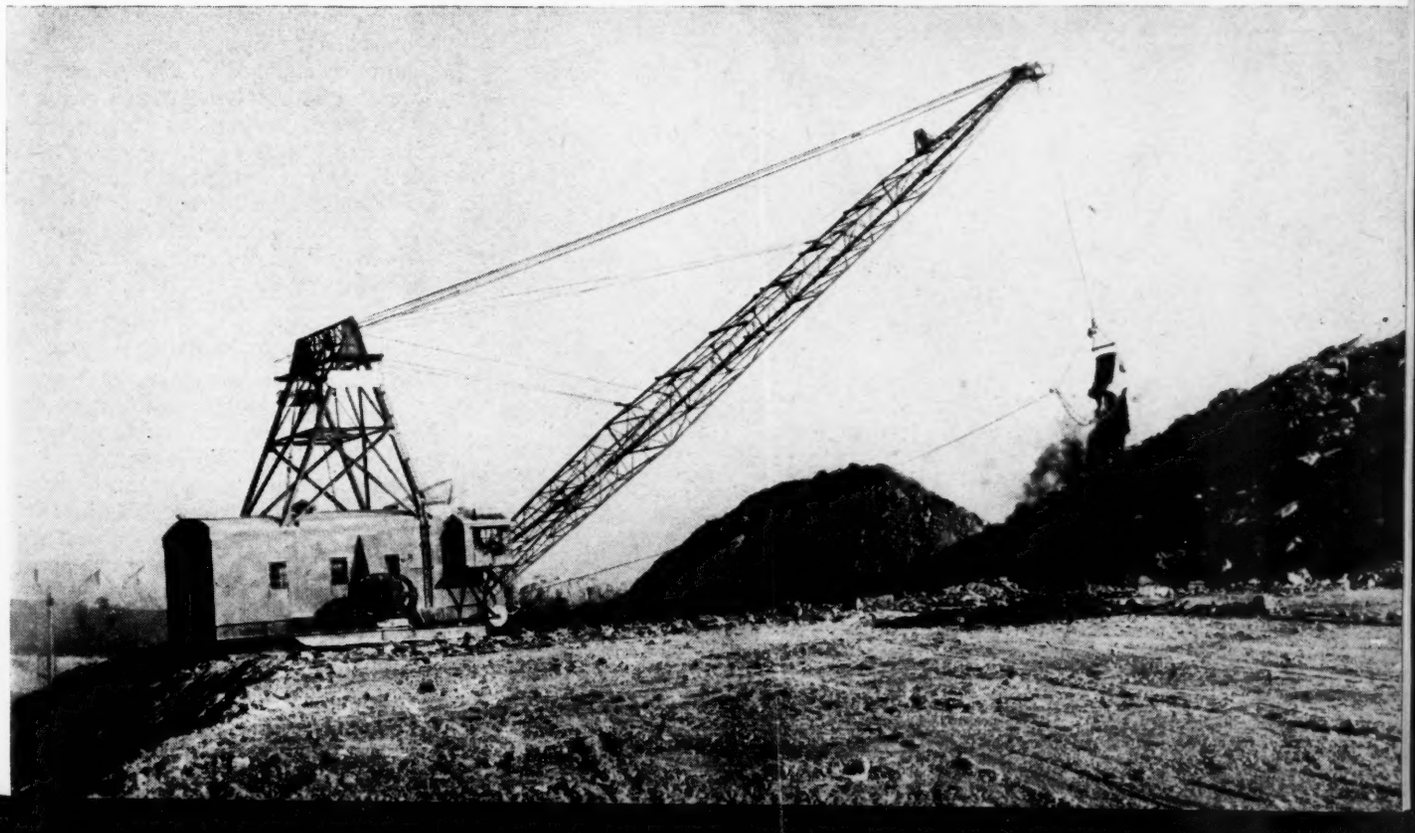
ahead in the "saddle area" where the overburden is under 90 ft. It will be worked in much the same manner as flat-seam stripping in the bituminous field. In this area of the Trevorton work the overburden will be cast only once.

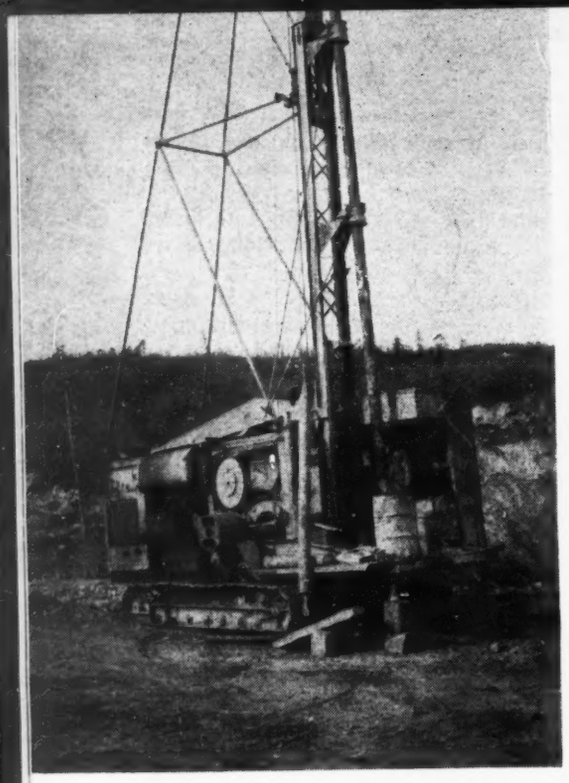
Bucyrus-Erie 42T churn drills (diesel and electric) are used for drilling 9-in. holes to depths ranging from 30 to 100 ft. Spacing of the holes varies from 18x18 ft. for shallow holes (under 45 ft.) to 22x24 ft. for deep holes (90 and sometimes 105 ft.). Explosive consumption ranges from 0.5 lb. per cubic yard in overburden moved by the 1150-B dragline to 1.0 lb. per cubic yard in sandstone moved by the 8-yd. and smaller units. All shooting is supervised by Hercules' field representative, Roland Pritchard. Occasionally when a wet hole is encountered, Hercules gelatin extra 40 percent dynamite (E.P.-81-B), one 7½x20-in. 50-lb. stick to the box, is used in the bottom of the hole. Also, throughout each hole, the gelatin is mixed with the other charge (Hercules E.P.-18-B, one 7½x26-in. 50-lb. stick to the box) to transmit the shock to the entire charge. Primacord-Bickford detonating fuse extends the full length of the hole and detonates any portion of the charge in contact with it. An electric cap is used to fire the detonating fuse. An illustration, elsewhere in the article, shows how the charge is decked in a 90-ft. hole on a 22x24-ft. spacing. The final stemming in each hole is at least 30 ft.

The fact that less powder is required for blasting ahead of the 1150-B dragline will help offset the recent price increase of explosives. It also will help the operation get by while the use of explosives is being curtailed. In the saddle area, when a drill goes into broken rock, as over an old breast, no powder is wasted on that hole. Neither is the charge increased for the neighboring holes. This also helps conserve powder.

A considerable quantity of steel rope

The 8-yd. dragline also has a 200-ft. boom.





Nine-inch holes are drilled to depths ranging from 30 to 100 ft.

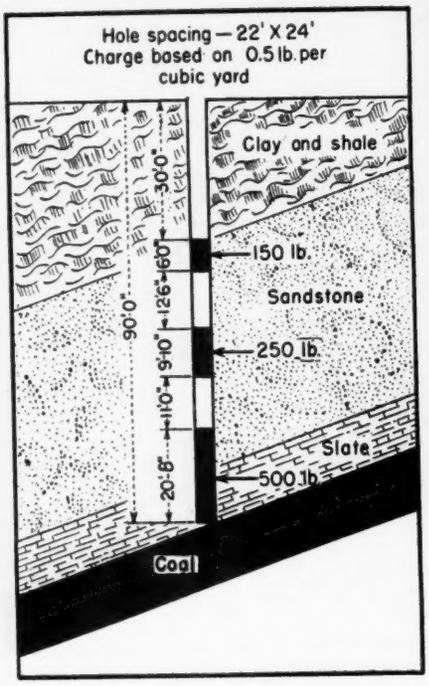
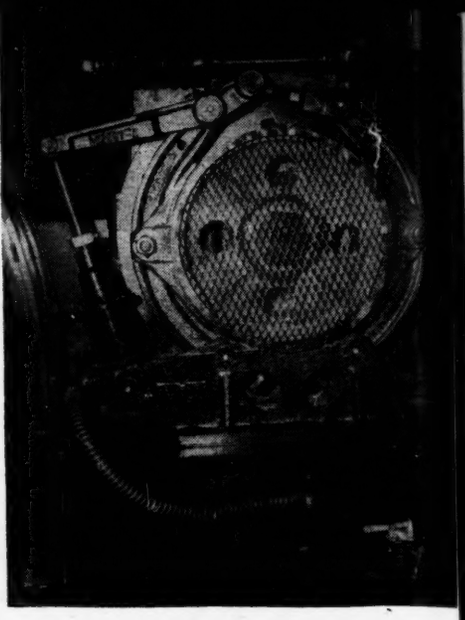


Fig. 2—How the charge is arranged in a 90-ft. hole.

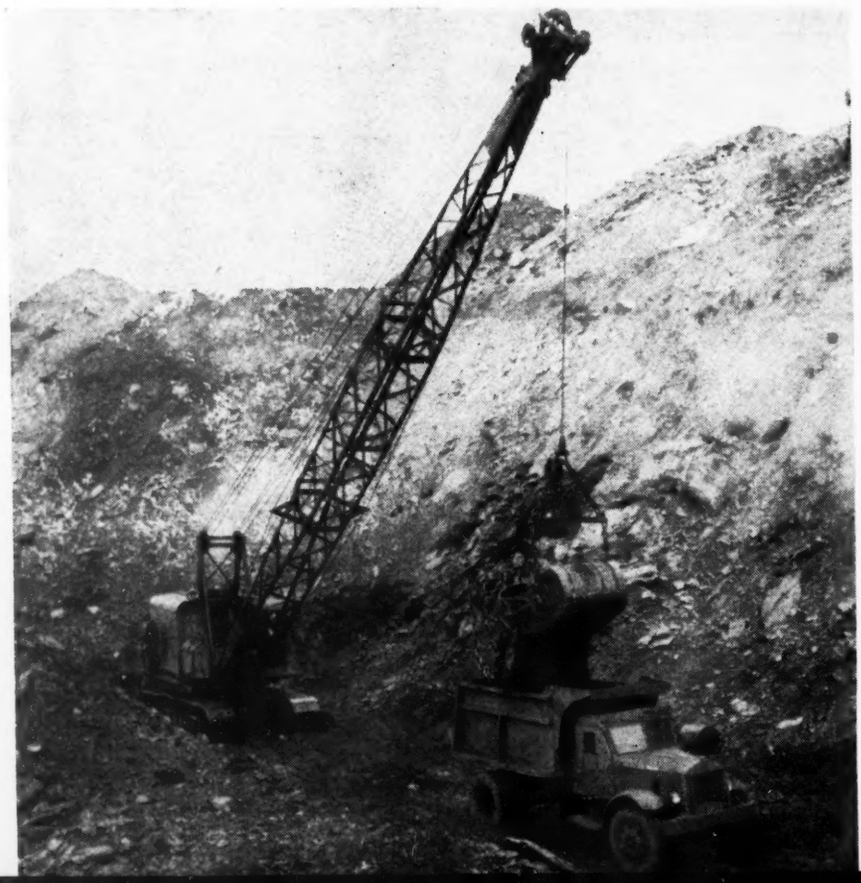


Both the hoist and drag cable drums have this type of brake.

is necessary to thread up a machine like the 1150-B. For example, the hoist rope is 2 in. in diameter and 477 ft. long. Two 2½-in.-diameter 285-ft.-long drag ropes are required. Each of the four lower suspension cables is 2½ in. in diameter and 66 ft. long. Although every stripping operation cannot escape having to carry an adequate supply of ropes and parts, Bucyrus has gone to considerable trouble to catalog the parts of all the 25-yd. machines already in the anthracite region to make the pooling of parts possible. This will help the users of this equipment to pool their repair-parts stocks and thereby provide themselves with faster and less costlier repair-parts service. So far as is known, this is the first time a manufacturer has provided its customers in one locality such a service.

The principal pieces of electrical equipment in the cab of the 1150-B dragline are shown in Fig. 3. It will be noted that each of the motors—drag, hoist and swing—has its own generator. In addition to the benefits already mentioned in connection with the Amplidyne control, smaller relays requiring less maintenance have replaced the large contactors typical of the old type of control. The ordinary separately excited d.c. generator, formerly used on large stripping units, responds to a change in field-circuit resistance by changing its terminal voltage, but only after an appreciable time delay, which is too long for precise control schemes. The field circuit power for this method of control is, roughly, 1 percent of the rated armature output. That is, the ratio of power controlled to power required by the control is about 100. The Amplidyne operates with a 1-watt signal giving a 10,000-watt output—an amplification factor of 10,000—with almost no time delay. It is accomplished in two stages of amplification interposed between the control power and the output power in a small motor-driven Amplidyne generator.

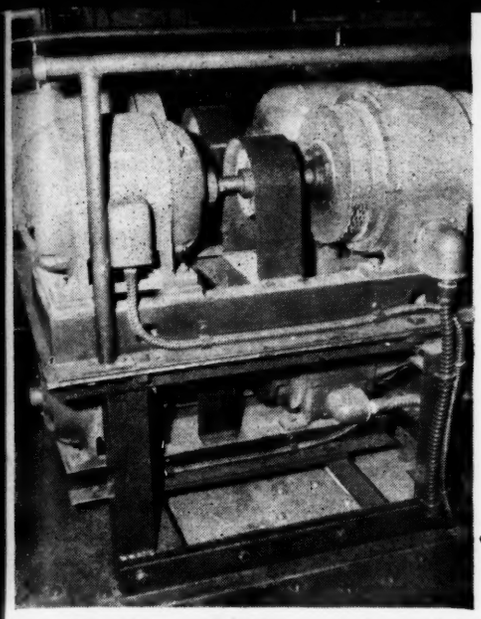
This 2½-yd. diesel-powered dragline loads coal for one of the subcontractors



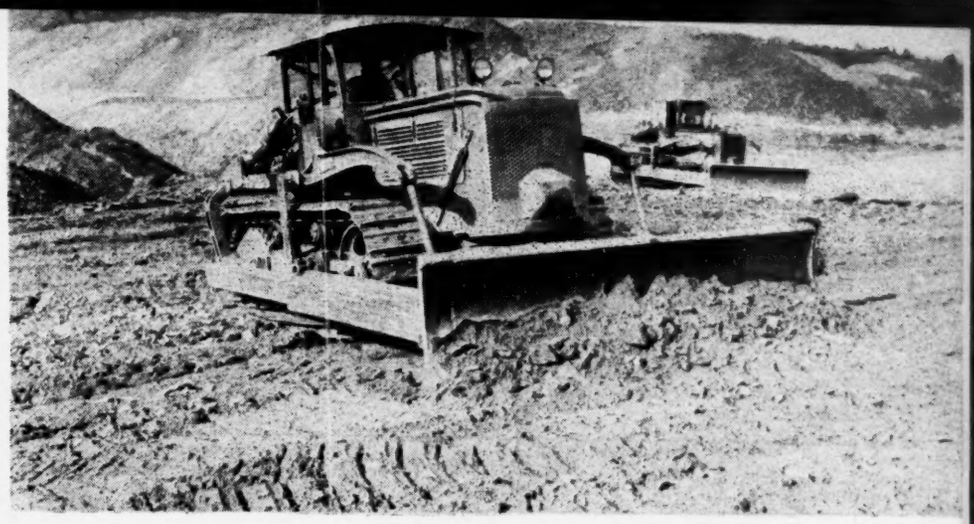
Heaters on Walking Device

The large exposed castings that are part of the walking mechanism on each side of the 1150-B unit are electrically heated, thermostatically controlled. It is necessary to heat the castings in cold weather to prevent the forming of frost that sometimes leads to the cracking of the castings. Similar castings on the 9-W machine are heated by open boxes of hot coals.

Power for the Trevorton stripping is



Special 5- and 10-kw. control sets help speed up the dragline's cycle of operation.



These bulldozers are preparing the way for the 25-yd. walking-type dragline to move around the end of the pit.

supplied by the Pennsylvania Power & Light Co. through a General Electric outdoor unit-type substation. A 19-ton three-phase 3,000-kva. 66/4.16-kv. transformer, with two 2½-percent taps above and below normal voltage, Thyrite arresters, Schweitzer & Conrad fuses, grounding resistor and two 1,200-amp. Type AM-5-100 Magna-Blast solenoid-operated (125 v. d. c.) metal-clad switchgear units for feeding the 4,160-volt circuits make up most of the substation's equipment. The AM-5-100 air circuit breaker has an interrupting capacity of 100,000 kva. The switching compartments are electrically heated and the breakers are tripped from a 24-volt battery supply. The 4-wire 4,160-volt circuits (Y-connected) are guarded by induction-type relays that afford instantaneous, time-delay and ground-fault protection.

Protection against the likelihood of a dangerously high voltage appearing between the mobile stripping equipment and ground, resulting from a ground fault on the distribution circuits, is not afforded by the usual protective schemes for power distribution circuits. At one time it was thought that adding ground wires to the portable cable, connected at one end to the shovel frame and at the other end to ground rods, was sufficient protection against this hazard. Actually, such protection is not adequate, since it is rarely possible to obtain a ground of low enough resistance.

Special Resistor Used

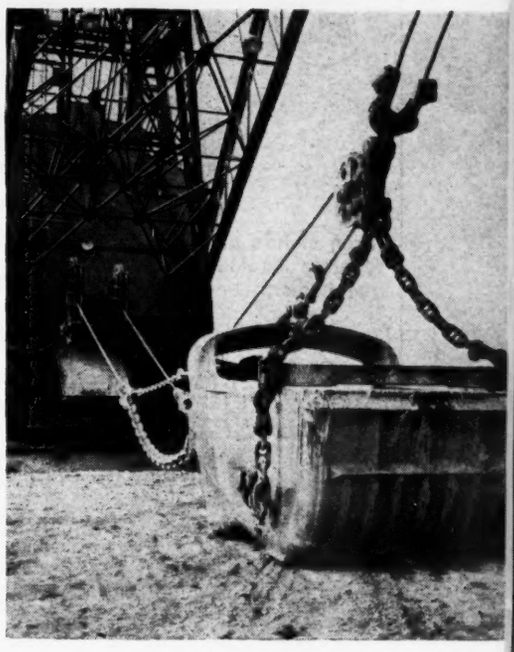
The latest scheme (Fig. 4) uses a resistor (about 96 ohms for a 4-160-volt system) between the transformer neutral and the substation ground, with a current transformer in the neutral-ground wire connected to a ground relay for tripping the substation's circuit breaker in case of a ground fault on the distribution lines. This is believed to be the most positive and practical scheme yet developed for safeguarding mine personnel from such hazards.

This scheme of ground protection is best explained in three steps:

1. The frames of all shovels, draglines and other mobile equipment supplied from the main distribution lines are connected through a ground wire of low impedance to the substation ground and to other grounds at or near cable taps and at intervals along the line, with sufficient ground connections to lower the resistance to ground to 5 ohms or less.

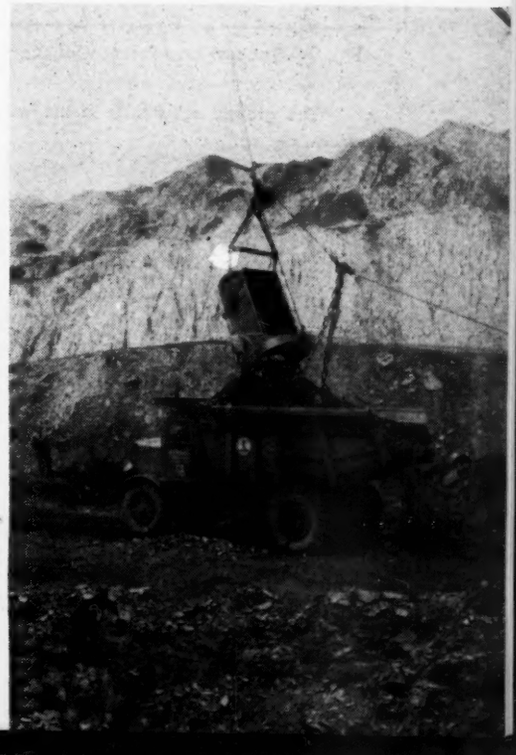
2. A resistor is then connected between the substation ground and the transformer neutral to limit the ground-fault current to a predetermined value (25-50 amp.). Conse-

The original tooth form (right) is reinforced with ¾-in. manganese steel plates before being installed on the 25-yd. bucket.



The two drag ropes for the bucket (right) are 2½ in. in diameter and 285 ft. long.

One of the newest trucks belonging to the Thomas fleet. Drivers leave their cabs while the trucks are being loaded.



quently, in the event a single ground fault occurs, the voltage drop in the ground wire or the ground connections will not cause a dangerous rise of potential above earth of the wire or the frames of any equipment connected to it. When a fault current flows, most of the drop will occur across the ground resistor, with the drop at other points, where an individual might be affected, being small in comparison (perhaps not over 100 volts). That is why the installation to ground of this neutral grounding resistor should be able to withstand at least the maximum phase-to-neutral voltage of the 4,160-volt system.

3. A current transformer is installed in the lead between the transformer neutral and ground and connected to a relay arranged to trip the feeder circuit. Any phase to neutral current will pass along this circuit and, if of any consequence, will trip the breaker and de-energize the circuit that happens to be affected.

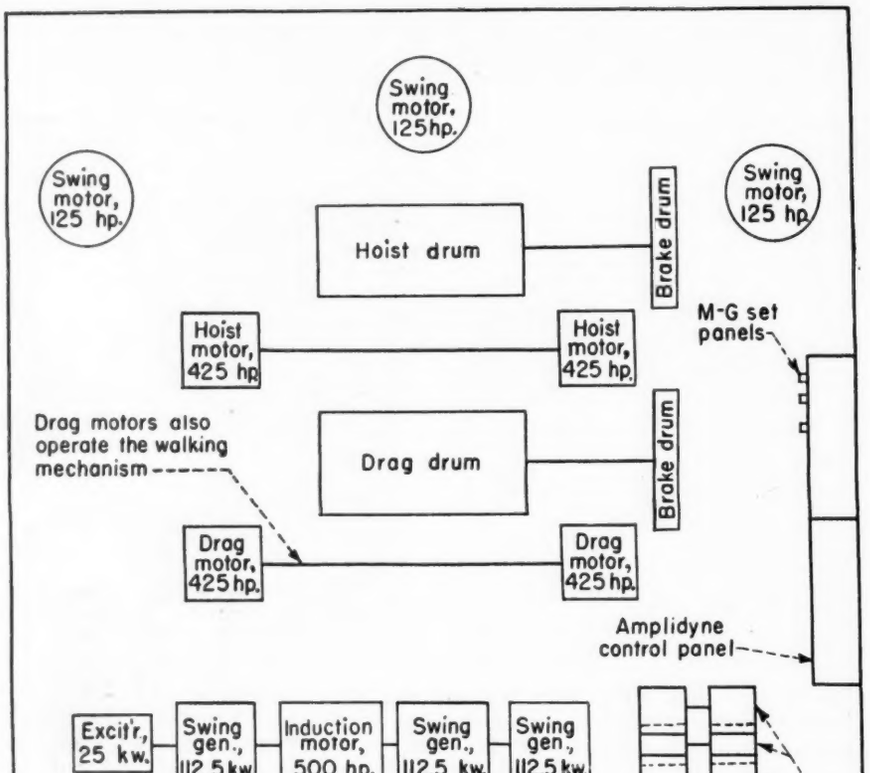
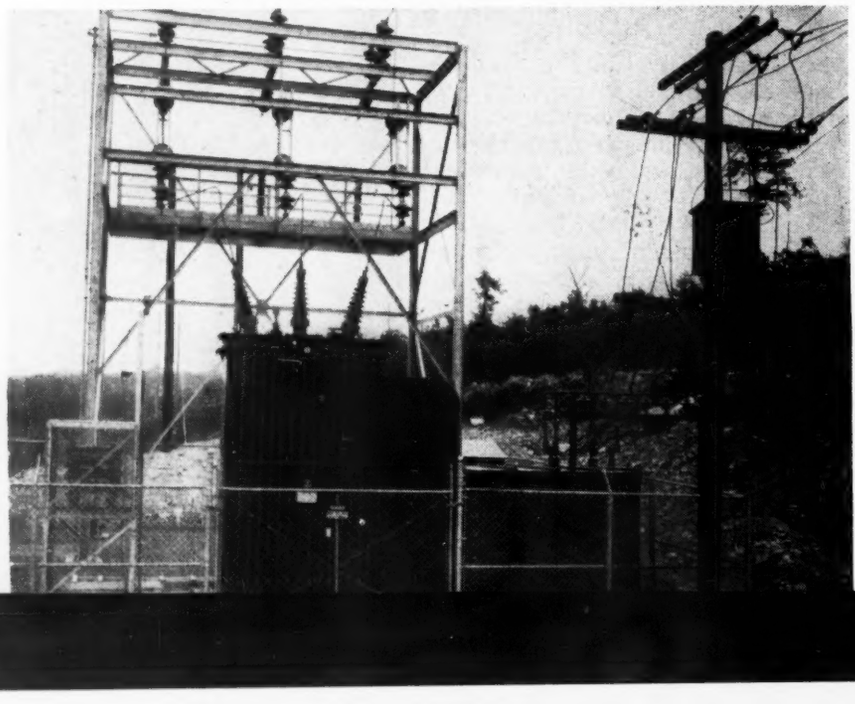


Fig. 3—General arrangement of the electrical equipment in the 25-yd. dragline.

The ground resistor is in the wire cage to the left of the transformer.



Digging Teeth Reinforced

An ever-present item of maintenance at the Trevorton operation is the repairing of the digging teeth for dragline buckets. New teeth for the 1150-B bucket are reinforced before they are used the first time. The top and bottom surfaces, which are subject to the greatest wear, are covered with ¾-in. manganese steel plates attached in three sections. Then the V-shaped sides are closed with ¾-in. mild-steel plates to prevent spreading of the tooth. Five teeth are required for a set. One extra set is carried on the machine and another set is available at the welding shop. A set ordinarily lasts about a week. However, in sandstone digging the teeth wear away much faster. The teeth are replaced before the manganese wearing plates are completely gone. The old plates are removed and new ¾-in. plates applied. Thus, the tooth form is used over and over.

A 120-B Bucyrus-Erie 5-yd. shovel (electric) and a 54-B 2½-yd. dragline (diesel) load the Mammoth Splits Nos. 8½ and 9 behind the 1150-B dragline. These units also load any divider rock which must be trucked from the pit. A 54-B 2½-yd. Bucyrus-Erie shovel loads behind the 9-W Bucyrus-Monighan 8-yd. dragline (both electric) in another pit where the Buck Mountain, or No. 5, vein is being recovered. The subcontractors for the Dick Construction Co. have a 2-yd. Lima dragline, 2½-yd. Lima dragline, 2-yd. Lorain shovel and a 2-yd. Lorain dragline (all diesel units).

Nine-Inch Holes Standard

Dick uses ten 9-in. 42T Bucyrus blast-hole drills for his part of the operation. Seven of the units are electrically driven and three use Caterpillar diesels. A 6-in. Loomis-Clipper gas-powered drill is used for the testing and prospecting work. There are three TD-18 and one TD-14 International tractors in service, all equipped with Bucyrus blades. An International-Warco road grader patrols the roads.

Dick also has eight trucks: two 21-yd. Macks with 278-hp. Cummins diesels; three 23-ton 1-TD Euclids with 275-hp. Cummins diesels and three 15-ton 27-FD Euclids with 150-

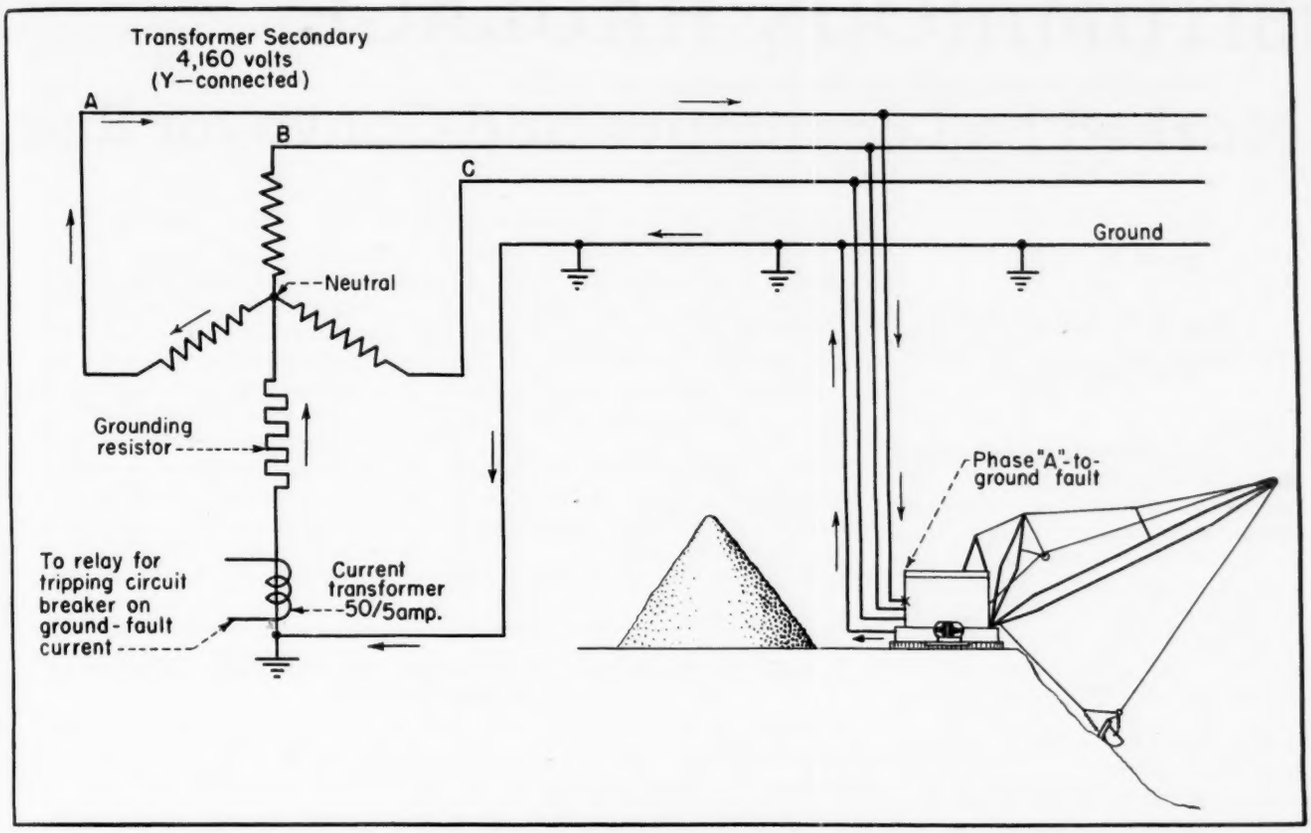


Fig. 4—The arrows indicate the path of the ground-fault current when Phase "A" grounds at the dragline.

hp. Cummins diesels. A water tank and a portable air compressor are carried on separate Euclid trucks. Thomas has three 27-FD Euclids, four of the large 3-TD Euclids, one 5-FD Euclid (all equipped with Cummins diesels) and seven 12-ton Sterling gas-powered units for hauling coal.

Trevorton stripping operations come directly under F. C. Caldwell, division superintendent for P. & R., and G. A. Schnee, division engineer, Ashland (Pa.) division office. Located at the company headquarters at Pottsville are George A. Roos, general manager; E. S. Christ, assistant general manager; Edward A. Lynch, director of personnel; William C. Muehlhof, chief engineer John B. Hicks, transportation engineer; Harry A. Leidich, safety inspector; Albert Brown, electrical engineer; C. E. Brown, mining engineer; and H. R. Hagen, mechanical engineer. R. E. Taggart, president, has his office in Philadelphia and Pottsville.

Officials and supervisors of the Dick Construction Co. at the stripping are Donald B. Dick, manager; Edward Lauer, superintendent; Fred Lupold, day foreman; George Jacoby, night foreman. George Thomas supervises the trucking of the coal for W. H. Thomas & Bros. A. E. Dick, president, and Arthur Dick Jr., treasurer, have their main offices in Hazleton, Pa.

Donald B. Dick (left), is manager at Trevorton for the Dick Construction Co. M. W. Gottschall (center), superintendent at Trevorton for four years, has been made superintendent of a new Dick operation in Virginia. H. B. Mellott (right) is a subcontractor for Dick.

George Jacoby (left), night foreman, and Edward Lauer, superintendent, supervise the double-shifted Trevorton stripping. John Blanksby (right) is chief clerk at Trevorton.

BITUMINOUS HAULAGE

Marked by Locomotive and Conveyor Rise

By W. H. YOUNG
Chief
And R. L. ANDERSON
Assistant Chief, Bituminous Coal Section
U. S. Bureau of Mines

COAL WAS TRANSPORTED underground chiefly by animals prior to 1880. The mule is most frequently associated with underground animal haulage, but horses, ponies, oxen and even dogs have been used. With production mounting rapidly from 1880 to 1900 and mines increasing in size, distances underground became greater and created a serious need for better transportation.

Rope-haulage units were first installed about 1870, replacing mules on main-line haulage in a considerable number of mines. A few steam locomotives were used underground at about the same time rope haulage was introduced. Compressed-air locomotives were introduced in 1875 and several were installed in mines in Pennsylvania and West Virginia. Electric mine locomotives were first employed in 1887 but use was rather limited until about 1900. A gasoline locomotive was first used in an underground mine in 1898, but few installations were made because of the dangers involved in their operation.

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Diesel mine locomotives were introduced in the Saar mines about 1927 and were commonly used in coal mining in Germany, France and Belgium. Although Diesel locomotives have had government approval, very few have been used in coal mines in the United States.

"The adoption of Diesel locomotives for main-line haulage and use in conjunction with shuttle cars, various types of conveyors or permissible storage-battery locomotives for gathering and secondary haulage appears to present the best available means of eliminating the fire, ignition, and contact hazard of the thousands of feet of bare trolley and feeder wires found in mines using the trolley-locomotive system, now thought to total at least 50,000 miles in underground workings.' (Harrington, D. and Warncke, R. G., "Hazards of Trolley-Locomotive Haulage System in Coal Mines," Bureau of Mines Information Circular 7328, 1945, p. 34.)

After 1905, the number of electric

Table I—Comparison of Main-Line Haulage Data Collected at Different Intervals

Location of mines	Illinois [1]	West Virginia [2]	Several States [3]
Data collected	About 1921	About 1933	1936
Number of mines	18	42	21
Average daily production per mine	2,100	2,120	2,500
Number of locomotives, total	48	112	84
Average weight of locomotives, tons	12.0	12.7	12.5
Average distance coal was hauled, miles	0.9	1.3	1.7
Average cars per trip	17	29	31.5
Average ton-miles of coal per locomotive per shift	670	1,148	1,081

[1] Stoek, H. H., Fleming, J. R., Hoskin, A. J., "A Study of Coal Mine Haulage in Illinois," University of Illinois Bulletin 132, 1922, pp. 80-81.
[2] McElroy, D. L., "Coal Mine Haulage in West Virginia," West Virginia University Bulletin 11, 1934, p. 67.
[3] Anderson, R. L., "Shaft and Slope-Bottom Lay-outs at Coal Mines," Bureau of Mines Information Circular 6949, 1937, pp. 34-35.

Fig. 1—Percent of underground bituminous output from mines using locomotives and mines using animals, with percent cut by machines and mechanically loaded in selected years.

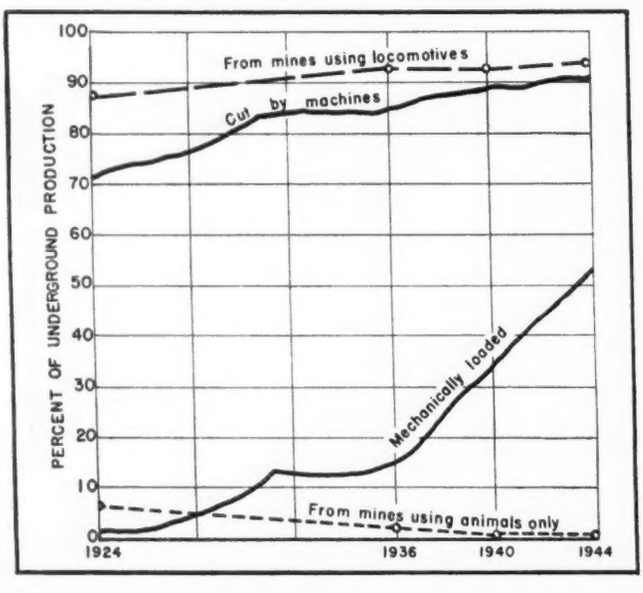
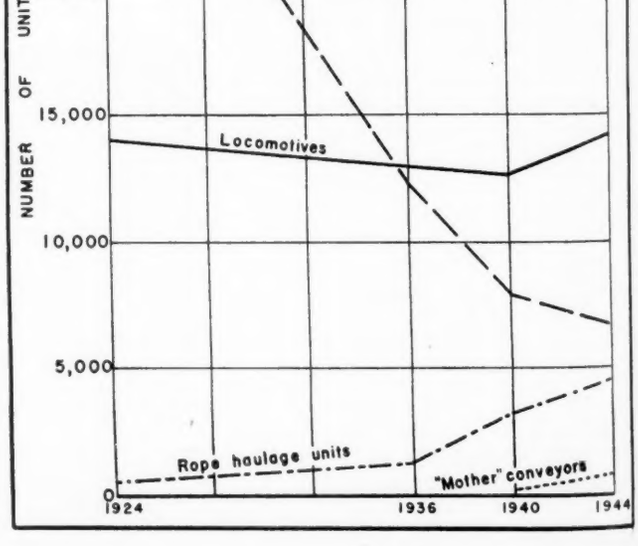


Fig. 2 — Haulage units at U. S. underground bituminous mines in selected years.



locomotives increased rapidly and main-line haulage was fairly well advanced before shortwall cutting machines came into general use about 1910.

Less than 1 percent of the underground output of bituminous coal was mechanically loaded before 1925. Uniform gains were made, except for the few depression years, from 1924 to 1936. Then, increases were rapid each year and, in 1944, almost 53 percent of the underground output was loaded mechanically. Fig. 1 shows the relation between tonnage from mines using certain types of haulage equipment and that cut by machines and mechanically loaded. This graph shows that haulage was mechanized many years before cutting and loading.

The summary in Table I compares certain main-line haulage data collected at different intervals. The group of mines marked "Several States" included the following: seven in Pennsylvania, seven in West Virginia, four in Illinois, two in Indiana and one in Kansas. Average daily production and average weight of locomotives was approximately the same at these three groups of mines. However, the average distance coal was hauled increased from 0.9 miles in 1921 to 1.7 miles in 1936 and the average ton-miles of coal hauled per locomotive per shift increased from 670 to approximately 1,100 during the same interval.

Gathering haulage consists of delivering the coal from the working faces to the nearest parting or siding, where it is picked up by the main-line locomotive. This is usually done by gathering locomotives, ranging from 5 to 8 tons in weight. There are five distinct types of gathering locomotives: (1) Cable-reel, (2) straight storage-battery, (3) combination trolley and storage-battery, (4) crab and (5) combination crab and reel. Conveyors, rubber-tired haulage units or shuttle cars, animals and rope hoists also are used for gathering or as a supplement to gathering haulage.

The information used in preparing the figures and tables for this paper was obtained from annual reports on production and mine operation sub-

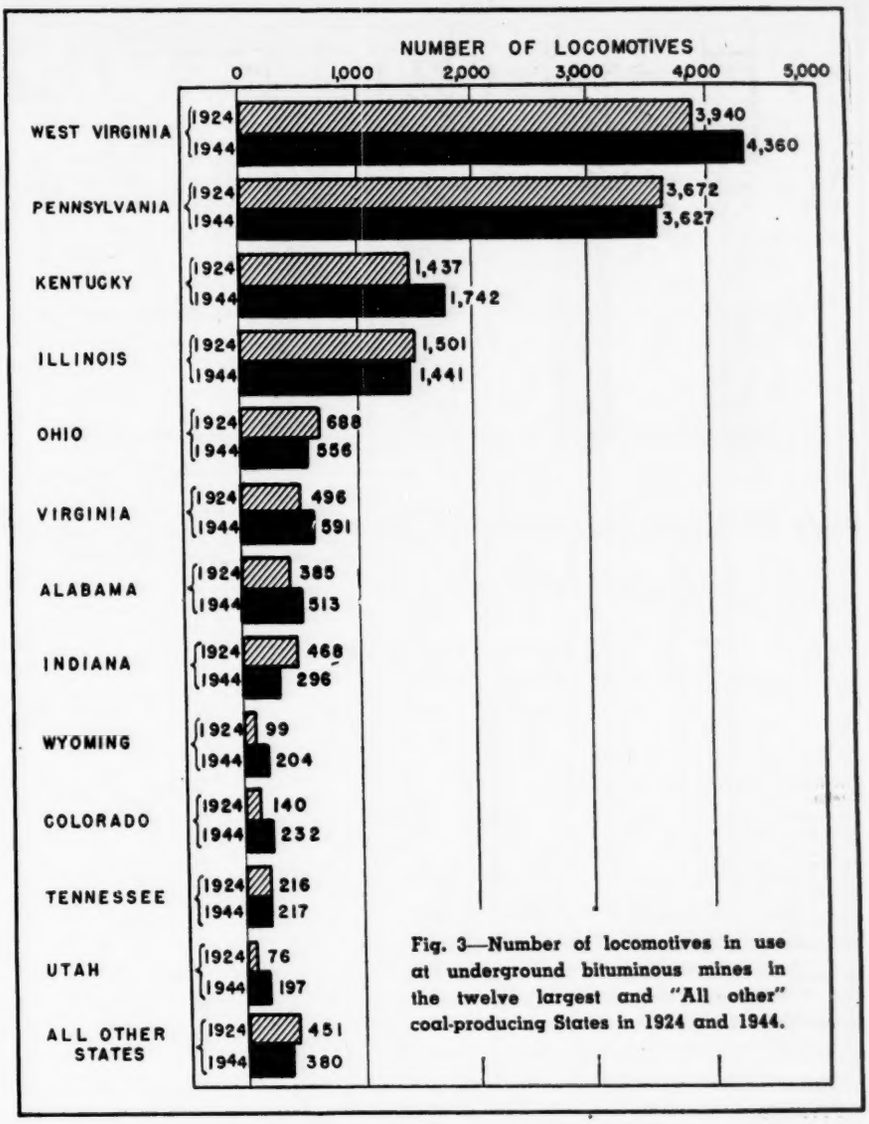


Fig. 3—Number of locomotives in use at underground bituminous mines in the twelve largest and "All other" coal-producing States in 1924 and 1944.

Table II—Animals and Locomotives Used in Underground Bituminous-Coal Mines[1]

(Includes mines with an average daily production of over 50 tons and all mines with rail or river connections, regardless of size)

State	ANIMALS				LOCOMOTIVES							
					1924		1936		1940		1944	
	1924	1936	1940	1944	Electric	Other types	Electric	Other types	Electric	Other types	Electric	Other types
Alabama	1,711	431	300	368	342	43	375	5	416	8	513	.....
Alaska	(2)	.....	.....	.....	(2)	(2)	.....	.....	5	.....	4	.....
Arkansas	212	194	95	39	3	.....	5	6	28	7	30	1
Colorado	1,542	625	481	379	136	4	140	8	166	21	229	3
Illinois	4,093	1,718	1,232	776	1,487	14	1,295	44	1,278	37	1,422	19
Indiana	1,391	219	149	143	466	2	311	3	259	10	295	1
Iowa	696	485	297	193	60	2	55	.....	46	.....	26	.....
Kansas	334	67	61	27	45	1	7	2	8	1	6	.....
Kentucky	2,244	864	531	675	1,424	13	1,574	43	1,550	20	1,736	6
Maryland	220	160	113	141	75	3	44	7	58	2	61	1
Michigan	95	12	12	2	39	.....	43	.....	30	.....	12	.....
Missouri	215	162	128	71	11	.....	11	4	4	1	6	.....
Montana	198	46	23	10	54	.....	48	1	71	.....	80	.....
New Mexico	436	109	43	32	76	1	52	4	48	4	68	.....
Ohio	2,070	738	393	264	686	2	512	1	465	15	554	2
Oklahoma	394	114	42	27	17	.....	12	3	7	1	22	.....
Pennsylvania	7,099	3,356	2,597	2,236	3,592	80	3,273	72	2,893	59	3,578	49
Tennessee	556	66	48	72	197	19	181	10	219	4	216	1
Utah	362	135	49	37	76	.....	116	5	119	2	196	1
Virginia	400	24	26	25	496	.....	503	1	577	.....	590	1
Washington	108	43	42	31	48	8	70	3	61	1	63	.....
West Virginia	5,110	1,716	1,228	1,195	3,845	95	3,767	76	3,987	44	4,339	21
Wyoming	418	85	47	11	98	1	157	.....	178	.....	204	.....
Other States [3]	28	22	19	8	8	.....	2	.....	.....	.....	.....	.....
Total [1]	29,932	11,391	7,956	6,762	13,281	288	12,553	298	12,473	237	14,250	106

[1] Exclusive of lignite and Virginia semi-anthracite. [2] Data not available. [3] Includes Georgia, Idaho, North Carolina and Texas.

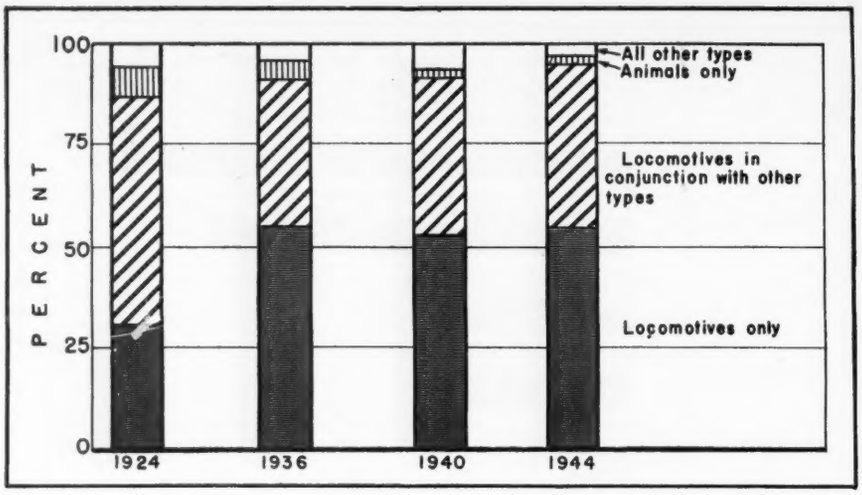


Fig. 4—Percentage of underground output of bituminous coal moved by various types of haulage equipment in the United States in selected years.

mitted by individual coal-mining companies to the U. S. Department of the Interior. These data include mines with an average daily production of over 50 tons and all mines with rail or river connections regardless of size.

In *Mineral Resources*, 1925, Part II, pp. 440-448, several tables on underground haulage equipment in 1924 were published. The authors have reworked the original 1924 schedules in

Table III—Rope-Haulage Units and "Mother" Conveyors Used in Underground Bituminous-Coal Mines, by States, in Selected Years[1]

(Includes mines with an average daily production of over 50 tons and all mines with rail or river connections, regardless of size)

State	Rope-haulage units				"Mother" conveyors					
					1940			1944		
	1924	1936	1940	1944	Number of units	Average length (feet)	Total length (miles)	Number of units	Average length (feet)	Total length (miles)
Alabama	56	76	82	110	15	380	1.1	70	324	4.3
Alaska	.....	.....	.....	1	.....	.....	.....	.....	.....	.....
Arkansas	10	82	49	43	5	1,020	1.0	11	736	1.5
Colorado	144	160	163	149	(2)	(2)	(2)	13	554	1.4
Illinois	14	13	35	43	7	1,071	1.4	25	1,138	5.4
Indiana	.....	4	9	10	5	233	0.2	(2)	(2)	(2)
Iowa	18	7	18	21	(2)	(2)	(2)	19	411	1.5
Kansas	.....	1	1	.....	.....	.....	.....	.....	.....	.....
Kentucky	7	11	31	63	14	1,016	2.7	76	1,363	19.6
Maryland	2	11	57	4	(2)	(2)	(2)	.....	.....	.....
Michigan	.....	.....	2	.....	.....	.....	.....	.....	.....	.....
Missouri	2	3	9	4	.....	.....	.....	.....	.....	.....
Montana	3	5	4	3	.....	.....	.....	.....	.....	.....
New Mexico	51	42	22	29	.....	.....	.....	.....	.....	.....
Ohio	10	15	19	28	25	1,012	4.8	27	1,015	5.6
Oklahoma	5	27	26	40	5	267	0.3	16	514	1.6
Pennsylvania	170	493	2,610	3,712	16	1,233	3.7	84	1,218	19.4
Tennessee	9	8	6	20	8	463	0.7	21	696	2.8
Utah	17	45	29	53	(2)	(2)	(2)	19	742	2.7
Virginia	.....	1	3	10	9	1,456	2.5	11	1,827	3.8
Washington	7	31	36	47	.....	.....	.....	.....	.....	.....
West Virginia	12	52	57	123	127	566	13.6	243	583	26.8
Wyoming	89	64	12	52	(2)	(2)	(2)	(2)	(2)	(2)
Undistributed [3]	2	.....	.....	.....	10	850	1.7	9	1,000	1.7
Total [1]	628	1,151	3,280	4,565	246	720	33.7	644	804	98.1

[1] Excludes lignite and Virginia semi-anthracite. [2] Included under "Undistributed." [3] Includes also North Carolina.

Table IV—Mines, Production and Percent of Total Underground Bituminous-Coal Output at Mines Using *Animals Only* for Haulage Purposes, by States, in Selected Years[1]

(Includes mines with an average daily production of over 50 tons and all mines with rail or river connections, regardless of size)

State	1924			1936			1940			1944		
	Number of mines	Production (net tons)	Percent underground output	Number of mines	Production (net tons)	Percent underground output	Number of mines	Production (net tons)	Percent underground output	Number of mines	Production (net tons)	Percent underground output
Alabama	56	3,069,403	16.6	11	340,907	2.9	7	129,030	0.9	24	1,013,879	6.0
Alaska	(2)	(2)	(2)	.....	.....	.....	.....	.....	.....	.....	.....	.....
Arkansas	18	641,246	60.1	9	85,262	5.5	5	47,858	3.5	1	40,139	3.1
Colorado	25	1,270,494	12.5	16	259,737	4.1	12	230,340	3.7	7	226,769	2.9
Illinois	50	1,831,721	2.8	91	2,043,320	5.0	58	1,135,160	3.1	30	895,239	1.5
Indiana	38	1,773,241	9.5	21	299,142	3.1	14	200,231	2.4	11	252,813	1.8
Iowa	27	1,027,097	20.6	50	1,170,524	38.6	25	444,578	22.3	8	175,986	12.8
Kansas	22	782,353	26.5	11	138,360	18.8	9	100,651	15.6	5	85,441	43.1
Kentucky	110	4,475,869	10.4	31	443,176	0.9	33	399,670	0.9	58	1,520,032	2.4
Maryland	12	371,944	18.8	7	339,514	21.9	8	181,006	13.4	5	140,543	9.0
Michigan	.....	.....	.....	2	26,725	4.4	2	27,189	6.6	.....	.....	.....
Missouri	31	982,761	79.3	18	563,666	53.9	19	468,470	58.9	11	305,071	60.3
Montana	4	91,934	3.5	3	25,117	1.5	1	12,841	0.8	3	68,355	3.1
New Mexico	2	38,738	1.4	.....	.....	.....	2	19,311	1.9	1	2,574	0.1
Ohio	49	2,817,689	10.6	19	573,000	2.8	12	139,136	0.9	5	90,779	0.4
Oklahoma	18	691,887	39.0	15	305,742	27.4	8	140,157	15.0	5	140,770	9.8
Pennsylvania	144	3,925,149	3.1	78	1,483,781	1.4	120	1,671,013	1.5	102	3,070,656	2.6
Tennessee	19	477,026	10.9	5	104,721	2.1	6	118,242	2.0	10	172,099	2.5
Texas	1	19,053	12.7	.....	.....	.....	1	9,337	100.0	.....	.....	.....
Utah	2	44,963	1.0	2	17,434	0.6	2	15,816	0.5	1	17,337	0.2
Virginia	10	184,605	1.8	1	11,500	0.1	2	26,001	0.2	5	103,061	0.5
Washington	2	220,005	8.5	7	150,739	8.6	7	229,279	14.6	1	6,913	0.5
West Virginia	108	4,743,567	4.8	20	271,355	0.2	35	580,093	0.5	52	1,345,270	0.9
Wyoming	10	1,004,955	14.9	4	86,609	1.6	4	94,075	1.7	3	34,816	0.4
Other States [3]	.....	.....	.....	2	27,243	.....	1	36,847	.....	1	16,363	.....
Total [1]	758	30,485,700	6.7	423	8,767,574	2.2	393	6,456,331	1.6	349	9,724,905	1.9

[1] Exclusive of lignite and Virginia semi-anthracite. [2] Data not available. [3] Includes Georgia and Idaho.

an effort to make the data as nearly comparable as possible with the figures for the other years selected. This task involved primarily elimination of the small mines from the 1924 data. The original tables for 1924 included 7,361 underground mines, but the 1924 tables shown in this article include only 4,200 mines. This difference of 3,161 represents the small mines producing less than 50 tons per day and having no rail or river connection.

Tables II and III show the number of animals, locomotives, and rope-haulage units in use in underground bituminous coal mines, by States, for 1924, 1936, 1940 and 1944, with data on "mother" conveyors for 1940 and 1944. Fig. 2 gives changes in the units in use in the entire United States.

Each State shows a considerable reduction in the number of animals in use during the 20-year period, and the total for the United States decreased from 29,932 to 6,762, or 77 percent. Electric locomotives increased 969, or 7 percent, while other types of locomotives decreased from 288 to 106 during this period. Although the increase in number of electric locomotives appears to be too small to offset the decrease in number of animals, it must be remembered that great advances have been made in mining and mechanization in the period 1924-44.

Fig. 3 shows the total number of locomotives in use at underground bituminous-coal mines in each of the 12 largest and "All other" coal-producing States in 1924 and 1944. The average annual underground production per locomotive in use showed little change during this period, increasing from 33,700 tons in 1924 to 35,200 in 1944.

"Other types" of locomotives include steam, compressed air, diesel, gasoline and many storage-battery

Table V—Mines, Production and Percent of Total Underground Bituminous-Coal Output at Mines Using *Locomotives Only* for Haulage Purposes, by States, in Selected Years[1]

(Includes mines with an average daily production of over 50 tons and all mines with rail or river connections, regardless of size)

State	1924			1936			1940			1944		
	Number of mines	Production (net tons)	Percent underground output	Number of mines	Production (net tons)	Percent underground output	Number of mines	Production (net tons)	Percent underground output	Number of mines	Production (net tons)	Percent underground output
Alabama	10	2,089,485	11.3	22	4,083,455	34.5	25	7,476,761	51.0	21	5,132,961	30.6
Alaska	(2)	(2)	(2)	.....	.....	.....	2	173,566	100.0	.....	.....	.....
Arkansas	.....	.....	.....	1	59,682	3.8	2	118,820	8.8	6	281,084	21.9
Colorado	2	288,220	2.8	3	186,189	2.9	10	609,022	9.9	19	1,875,247	24.1
Illinois	30	15,545,052	23.8	33	16,393,575	40.4	27	13,979,579	38.2	48	42,763,048	73.1
Indiana	25	4,999,859	26.8	25	6,820,965	70.1	17	6,184,887	74.8	18	10,137,497	74.1
Iowa	2	105,842	2.1	.....	.....	.....	.....	.....	.....	1	22,757	1.7
Kansas	4	226,235	7.6	1	16,483	2.2	2	35,325	5.5	2	64,684	32.7
Kentucky	187	22,126,305	51.2	177	34,610,936	73.6	167	33,806,019	71.2	183	38,345,843	61.3
Maryland	7	216,769	10.9	5	415,063	26.8	4	274,976	20.4	3	457,312	29.3
Michigan	1	244,190	29.5	6	495,135	80.6	4	156,105	38.1	1	99,175	74.0
Missouri	4	118,429	9.6	4	52,547	5.0	1	21,251	2.7	1	18,923	3.7
Montana	1	24,824	1.0	2	658,943	40.0	3	638,530	40.9	4	1,674,287	75.7
New Mexico	.....	.....	.....	.....	.....	.....	1	73,178	7.1	2	489,597	29.5
Ohio	49	4,907,113	18.6	44	8,879,598	44.0	40	7,532,729	45.8	50	10,041,708	47.3
Oklahoma	1	60,000	3.4	.....	.....	.....	2	116,625	12.5	1	151,246	10.5
Pennsylvania	383	38,033,512	30.2	243	44,290,275	42.0	157	39,701,715	35.9	173	44,760,696	37.2
Tennessee	10	754,969	17.2	28	3,927,798	78.5	29	4,883,231	83.8	29	4,029,757	59.0
Texas	1	30,436	20.3	.....	.....	.....	.....	.....	.....	.....	.....	.....
Utah	1	73,356	1.6	5	728,244	23.3	6	1,086,661	31.7	3	230,345	3.3
Virginia	40	6,677,588	64.3	56	11,047,456	96.7	50	13,355,494	89.0	55	16,153,699	85.2
Washington	6	805,306	31.1	7	392,808	22.5	5	128,469	8.2	7	158,798	11.5
West Virginia	373	46,000,845	45.9	354	85,713,880	73.0	293	82,545,273	66.3	328	98,892,089	65.5
Wyoming	2	172,523	2.6	7	1,032,926	18.6	10	2,527,388	45.5	4	1,333,823	14.9
Total [1]	1,139	143,500,858	31.3	1,023	219,805,958	55.2	857	215,425,604	53.0	959	277,114,576	54.8

[1] Exclusive of lignite and Virginia semi-anthracite. [2] Data not available.

Table VI—Mines, Production, and Percent of Total Underground Bituminous-Coal Output at Mines Using *Locomotives in Conjunction with Other Types* of Haulage Equipment, by States, in Selected Years[1]

(Includes mines with an average daily production of over 50 tons and all mines with rail or river connections, regardless of size)

State	1924			1936			1940			1944		
	Number of mines	Production (net tons)	Percent underground output	Number of mines	Production (net tons)	Percent underground output	Number of mines	Production (net tons)	Percent underground output	Number of mines	Production (net tons)	Percent underground output
Alabama	78	10,958,296	59.1	23	6,569,201	55.6	23	5,305,293	36.1	27	8,181,703	48.7
Alaska	(2)	(2)	(2)	.....	.....	.....	.....	.....	.....	1	68,407	19.7
Arkansas	4	97,699	9.1	4	328,787	21.0	5	202,166	14.9	8	449,836	35.0
Colorado	45	6,214,287	61.3	38	4,363,824	69.3	32	3,784,817	61.3	30	4,168,643	53.6
Illinois	197	47,242,491	72.1	107	21,837,454	53.8	110	20,461,288	56.0	103	14,199,777	24.3
Indiana	72	10,863,872	58.3	13	1,759,621	18.1	17	1,628,913	19.7	12	2,993,922	21.9
Iowa	25	2,767,264	55.5	17	1,662,411	54.9	15	1,175,606	58.9	11	749,860	54.4
Kansas	17	1,321,024	44.7	4	415,967	56.7	3	381,850	59.4	1	47,985	24.2
Kentucky	165	16,239,918	37.6	63	10,793,763	22.9	56	11,128,957	23.5	73	17,336,478	27.7
Maryland	23	1,178,236	59.4	11	527,703	34.1	14	739,404	54.7	13	859,758	55.1
Michigan	7	583,330	70.5	2	77,591	12.6	4	226,875	55.3	1	19,471	14.5
Missouri	3	99,992	8.1	6	195,540	18.7	2	44,837	5.6	4	138,271	27.3
Montana	11	2,197,929	85.2	6	854,942	51.9	3	863,013	55.3	3	470,020	21.2
New Mexico	17	2,338,682	85.4	10	1,389,450	93.2	7	799,104	78.0	5	969,109	58.4
Ohio	163	18,224,802	68.9	64	9,886,910	49.0	57	7,639,534	46.5	68	9,718,069	45.8
Oklahoma	8	404,464	22.8	8	317,492	28.5	3	98,931	10.6	7	716,907	49.9
Pennsylvania	481	75,534,735	59.9	225	55,124,310	52.2	206	60,108,528	54.3	283	68,880,361	57.2
Tennessee	46	2,984,786	68.0	6	661,820	13.2	10	571,063	9.8	13	1,847,194	27.1
Texas	3	85,198	56.9	1	22,730	69.4	.....	.....	.....	.....	.....	.....
Utah	21	4,076,734	91.2	16	2,270,837	72.7	12	2,215,245	64.6	19	6,675,881	94.5
Virginia	27	3,488,038	33.6	4	215,545	1.9	8	1,350,836	9.0	11	2,545,553	13.4
Washington	11	1,242,564	48.0	8	802,952	45.9	8	1,005,018	64.2	8	872,628	63.5
West Virginia	413	47,222,959	47.1	120	27,996,970	23.9	130	38,699,216	31.1	192	48,766,779	32.3
Wyoming	21	4,027,076	59.8	15	4,039,521	72.6	11	2,711,438	48.8	17	7,365,444	82.7
Total [1]	1,858	259,394,376	56.7	771	152,115,341	38.2	736	161,141,932	39.7	910	198,042,056	39.2

[1] Exclusive of lignite and Virginia semi-anthracite. [2] Data not available.

Table VII—Mines, Production, and Percent of Total Underground Bituminous-Coal Output at Mines Using *Types or Combinations of Types* of Haulage Equipment *Other Than Those Shown in Preceding Tables IV, V and VI*, by States, in Selected Years[1]

(Includes mines with an average daily production of over 50 tons and all mines with rail or river connections, regardless of size)

State	1924			1936			1940			1944		
	Number of mines	Production (net tons)	Percent underground output	Number of mines	Production (net tons)	Percent underground output	Number of mines	Production (net tons)	Percent underground output	Number of mines	Production (net tons)	Percent underground output
Alabama	32	2,414,333	13.0	19	821,915	7.0	19	1,759,090	12.0	30	2,463,651	14.7
Alaska	(2)	(2)	(2)	2	127,755	100.0	.....	.....	.....	5	278,622	80.3
Arkansas	9	328,205	30.8	49	1,087,435	69.7	36	984,721	72.8	19	515,261	40.0
Colorado	37	2,362,312	23.4	43	1,490,938	23.7	37	1,548,615	25.1	30	1,500,792	19.4
Illinois	21	867,659	1.3	10	310,350	0.8	44	965,961	2.7	25	600,434	1.1
Indiana	7	995,807	5.4	24	854,928	8.7	12	255,457	3.1	13	297,505	2.2
Iowa	21	1,086,092	21.8	7	197,010	6.5	30	376,017	18.8	21	429,785	31.1
Kansas	15	628,168	21.2	7	163,423	22.3	7	125,525	19.5	.....	.....	.....
Kentucky	11	345,160	0.8	37	1,179,478	2.6	52	2,117,492	4.4	128	5,324,677	8.6
Maryland	7	216,675	10.9	14	265,935	17.2	14	155,257	11.5	6	102,566	6.6
Michigan	.....	.....	.....	2	14,788	2.4	.....	.....	.....	1	15,467	11.5
Missouri	2	37,211	3.0	16	233,731	22.4	16	260,041	32.8	2	44,049	8.7
Montana	3	265,021	10.3	5	109,632	6.6	3	47,118	3.0	.....	.....	.....
New Mexico	6	360,552	13.2	4	101,732	6.8	5	132,744	13.0	4	198,838	12.0
North Carolina	2	57,094	100.0	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ohio	23	517,887	1.9	52	850,404	4.2	32	1,119,979	6.8	26	1,375,582	6.5
Oklahoma	19	616,530	34.8	34	492,225	44.1	41	580,016	61.9	27	428,382	29.8
Pennsylvania	141	8,602,039	6.8	183	4,706,995	4.4	260	9,113,398	8.3	148	3,626,037	3.0
Tennessee	7	172,897	3.9	18	306,643	6.2	15	255,522	4.4	24	777,154	11.4
Texas	2	15,127	10.1	1	10,000	30.6	.....	.....	.....	.....	.....	.....
Utah	4	275,125	6.2	6	108,481	3.4	4	109,596	3.2	8	144,343	2.0
Virginia	4	38,877	0.3	14	143,812	1.3	6	272,910	1.8	10	162,016	0.9
Washington	9	319,544	12.4	11	402,688	23.0	5	203,324	13.0	8	336,979	24.5
West Virginia	49	2,245,085	2.2	71	3,379,329	2.9	65	2,650,185	2.1	63	1,934,052	1.3
Wyoming	14	1,526,207	22.7	8	402,455	7.2	5	221,558	4.0	4	176,265	2.0
Total [1]	445	24,293,607	5.3	637	17,762,082	4.4	708	23,254,526	5.7	602	20,732,457	4.1

[1] Exclusive of lignite and Virginia semi-anthracite. [2] Data not available.

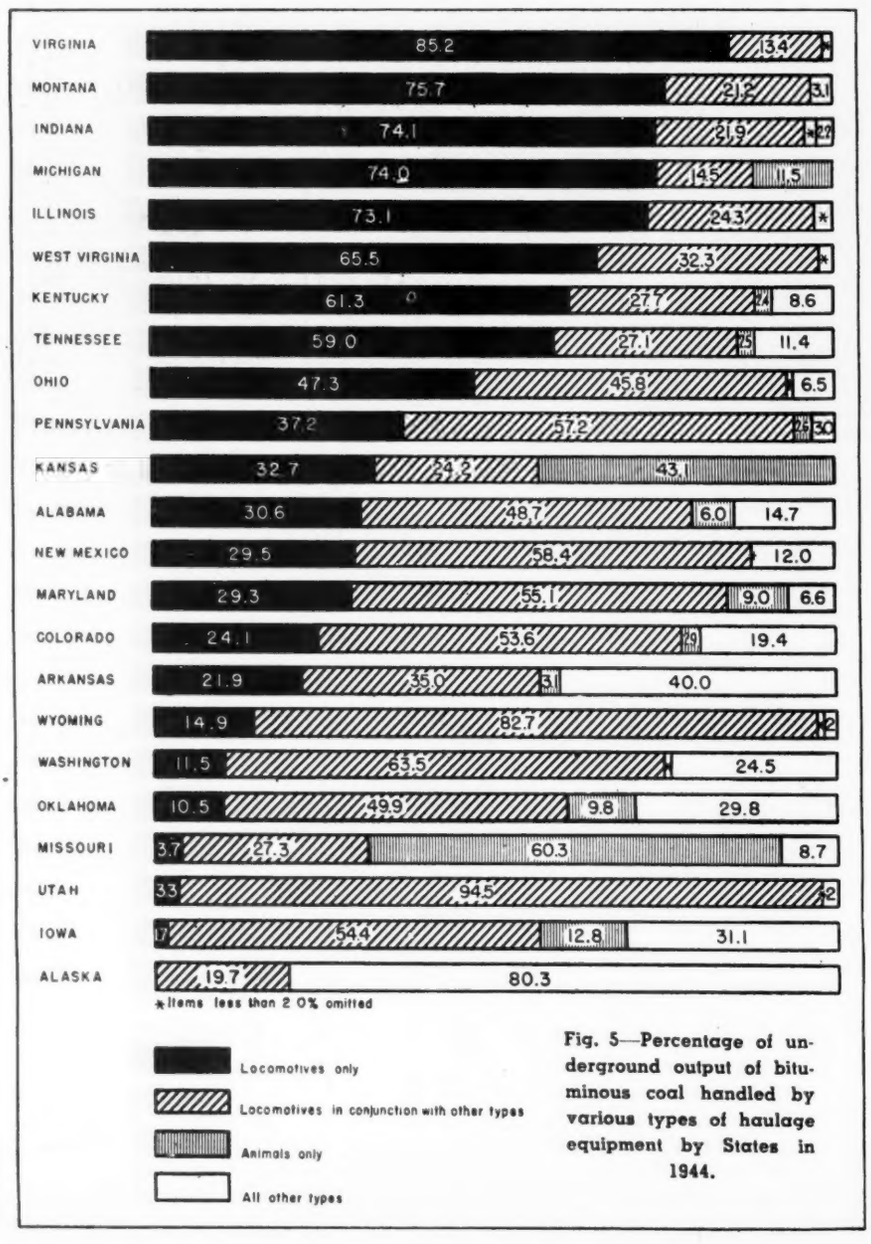


Fig. 5—Percentage of underground output of bituminous coal handled by various types of haulage equipment by States in 1944.

units. In 1944, storage-battery locomotives were counted as electric locomotives, but many probably were included with "Other types" in 1924, 1936 and 1940.

Rope-haulage units include both portable and stationary hoists but exclude scraper hoists, shaft and main-slope hoists, and hoists for car shifting at conveyor heads or slope conveyors. Practically all the growth in rope-haulage units occurred in Pennsylvania, increasing from 170 in 1924 to 3,712 in 1944. This increase was probably due to the installation of room hoists.

The "mother" conveyor, a large belt conveyor used for haulage purposes, is a comparatively new type of underground haulage equipment. The first installation in bituminous-coal mines was in 1929, but it was not until about six years later that a 100-percent belt-conveyor mine was in operation. During the period 1940-44 the number of "mother" conveyors increased from 246 to 644, or 162 percent, and the total length of installations increased from 33.7 miles to 98.1, or 191 percent. These data on "mother" conveyors do not include main-slope conveyors.

Tables IV, V, VI and VII show number of mines, production, and percentage of underground output for various types of haulage, by States, for 1924, 1936, 1940 and 1944.

The percentage of underground output handled by various types of haulage equipment in the United States in selected years is shown in Fig. 4 and similar data, by States, for the year 1944 are shown in Fig. 5.

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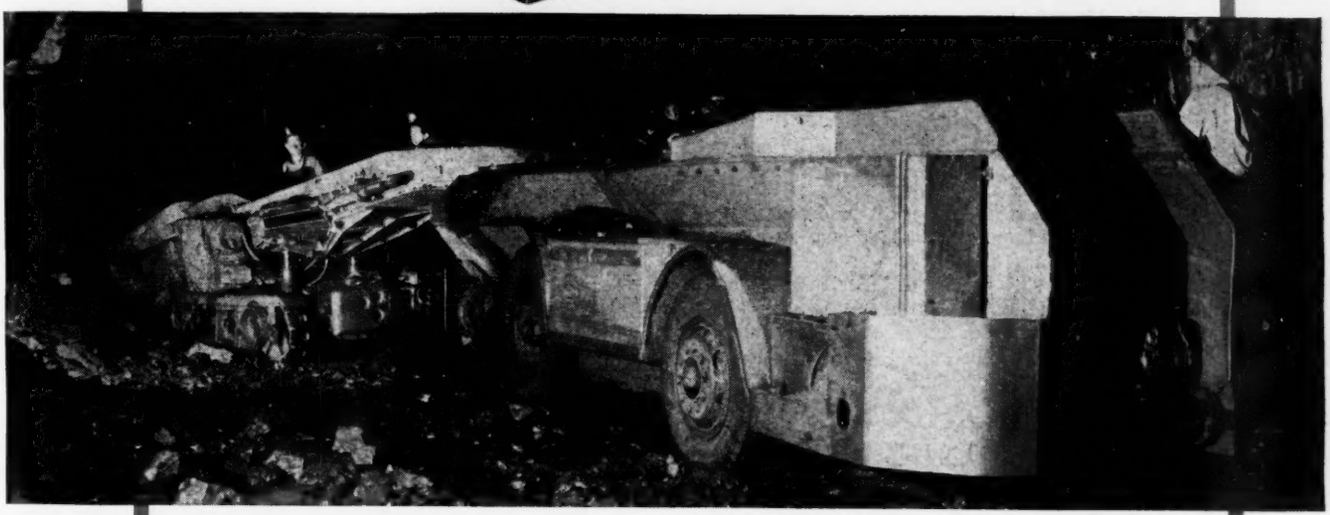

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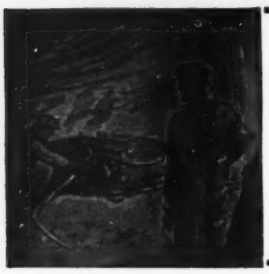

The Foremen's Forum

Carbon Monoxide in the Mine— How to Keep It From Following You

How Much Carbon Monoxide Can the Body Endure? How It Gets Through the Mine and How to Stop It

WHEN THE AIR we breathe contains carbon monoxide (CO), as it does in the mines during a mine fire or after an explosion, we admit a certain quantity of that gas into our lungs and thence into our blood every time we take a breath, the quantity depending on what quantity of that gas is present in the air we breathe. The number of cubic feet in 100 cu.ft. of air is known as the "concentration" of carbon monoxide in the atmosphere of the mine.

How Much Is Harmless

Percentage or Parts per Million—It has been found that a hundredth of a cubic foot, or in other words, 0.01 cu.ft., of carbon monoxide in a cubic foot of atmosphere, has no observable harming effect on the human body, however long or vigorously that atmosphere is breathed. Multiplying both items of the ratio by 100, that concentration may be described as 100×0.01, or 1 cu.ft. in 100×100 cu.ft. of atmosphere, or 1 cu.ft. of carbon monoxide in 10,000 cu.ft. of atmosphere, but it is more usual to use 1,000,000 cu.ft. of atmosphere as the figure for the comparison, and 100 cu.ft. of carbon monoxide in 1,000,000 is that same concentration. We write it as 100 parts per million or in short, 100 p.p.m.

When at rest, twice that concentration, 2×0.01 or 0.02 percent (200 p.p.m.), in three hours will produce effects that you will begin to notice and three times as much as 0.01 percent, or 0.03, in three restful hours will make the stomach so nervous that it will try to throw out the carbon monoxide with all the food and water therewith associated, and you will have what is known as "nausea."

This nausea is termed a "defense mechanism" of the body, which is trying to get rid of the poison. As it affects the nerves, it also causes headache. If the air contains five times as much carbon monoxide as we have just said is apparently harmless, then you will be breathing $5 \times 0.01 = 0.05$ percent of carbon monoxide or 500 p.p.m., and this, if you are resting, will prove, even in three hours, a dangerous quantity.

Fast and Slow Breathing—Small concentrations of carbon monoxide are harmless, because the body does not allow them to accumulate, but can remove them as fast as they enter. The figures that have been given here have been based (1) on a human being who "draws in" or rather lets in a usual quantity of air in proportion to the total area of his skin and (2) on this same man resting quietly for three hours, as already has been stated.

If he is working, he will let into his lungs three times as much air per hour as when he is resting, and thus, in the same concentration of carbon monoxide, he will have three times as much carbon monoxide to get rid of. If he is walking, he will draw in only twice as much air per hour as when he is resting, and so, in the same kind of air, he will have only twice as much carbon monoxide to get rid of. From these figures, the accompanying table has been constructed. Yandell Henderson and H. W. Haggard's "Noxious Gases" is the authority.

Don't Exercise Needlessly

Keep Quiet and Rest—Yandell Henderson says that if you keep quiet and rest, you can breathe that concentration for three times as long as when you are working and twice as long as when you are walking. That is why, if you get in an atmosphere containing more than 0.01 percent or 100 p.p.m., as during a mine fire or an explosion, and cannot escape to the surface, you should walk to a safe place and then rest as quietly as possible. The more you hustle, the less hours you will live. The more you rest, the longer you will live. Shortened exposure and abstinence from labor are two of the means of preserving life in such an atmosphere.

Two More Safety Rules

Suppress Ventilation and Avoid Bad Air—The best way to protect yourself after a mine explosion is (1) to suppress all the ventilation you can, and then (2) to stay away from the places where carbon monoxide is present or may later be present and (3) to rest as much as possible when you get to such a place. Lying down is the best way to rest.

In most cases, the working face will be the safest place to rest, unless the explosion occurred in or near that working face, in which case, the working place will be so polluted with carbon monoxide that you will surely be dead already and nothing can be done to save you.

Methane Suffocation

Enemy From Behind—Unfortunately, the methane and carbon dioxide in that place may soon render it unsafe. To avoid suffocation from these gases, it is necessary to keep away from the face far enough to avoid that second form of danger. So the safest place in which you can lie down after an explosion is not *at* the working face but near it; how *near* depends on how much methane the mine face discharges. In a methanous mine, you should keep some distance away from the face. In a mine that is not methanous, you will do well to lie down not far from the working face.

In general, perhaps a few feet (say 6 ft.) inby the neck of your room will be that safe refuge, but you must keep away from a crowd of other men, whose breath may produce too much carbon dioxide for your safety and for theirs. It takes courage to retire to such a place, to give up trying to escape and to lie down alone in such surroundings and put out all lights except electric lamps, but you must do so, because your life depends on your bravery and good judgment.

Pressure Movements of Air

Bad Air May Be Pushed Forward in Mine—Even when there is no fan to circulate air and no natural air current, increases in the pressure of the air outside the mine, (barometric, or "baric", pressure we term it) will usually occur, because the methane, leaves the goaf during low-pressure periods, and makes the mine atmosphere unusually explosive. So, most explosions occur when the air pressure is

EFFECTS OF CARBON MONOXIDE

P.P.M.	Hours of Exposure to Polluted Atmosphere: Working	Walking	Resting	
100	Unlimited	Unlimited	Unlimited	No determinable effect
200	1 hr.	1 1/2	3	Slight effect
300	1 hr.	1 1/2	3	Nausea and headache
500	1 hr.	1 1/2	3	Dangerous

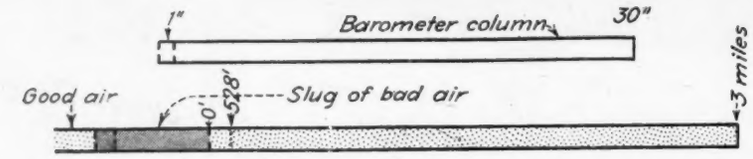

Fig. 1—Barometer column drops 1 in 30 with an inch fall in pressure, so bad air travels in a tunnel 1 in 30 under the same conditions, or 528 ft. in three miles

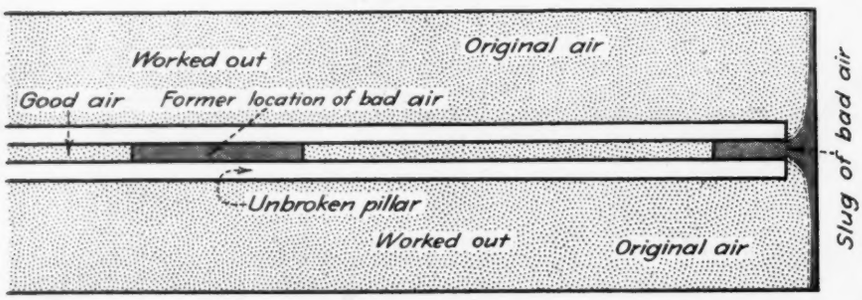

Fig. 2—Here the tunnel opens into old workings at its extreme end and, because of the big shrinkage in these workings, the bad air moves up to face of the tunnel and to face of the old workings, followed by good air which stays in tunnel.

low. Then, after the explosion the increase of pressure that will almost inevitably follow will push bad air part of the way toward the working face, but not the entire distance, because the increase of pressure on the outside of the mine compresses the air all through the mine, including, of course, the working face, and the back pressure of the air will limit the advance of the incoming air.

But the increase in pressure will not be likely to exceed the pressure of an inch of mercury, or one-thirtieth of the usual pressure, which is about equal to the pressure of 30 in. of mercury. (See Fig. 1). One-inch change in mercury pressure would only compress the air one-thirtieth, so that it is natural to say that, if the working place is 3 miles from the point where the poisonous air is present, the bad air will be pushed only a thirtieth of 3 miles or a tenth of a mile, 528 ft. (See Fig. 1).

It would seem silly to state that this would endanger anyone at the working face, which will be 2.9 miles further in. But is it so silly? The headings are narrow and few are wide open, and the air naturally travels them. It does not travel so readily into and through the parts of the mine that have been "sealed," or which long ago have caved more or less tightly and on which the roof has subsided squeezing the clay and softened shale into the rock and making a tight impervious filling, through which air cannot pass.

For this reason, the increased pressure of the air outside, drives air mainly along the headings, and this air has to fill up the space vacated by the compressed, and therefore shrinking, air, not only in the headings but also in areas still open in the workings near the face and perhaps in other areas not quite so open. Sometimes, the old workings are sealed with some degree of perfection, so the headings are the sole means of approach to the end of such sealing and the one-thirtieth of the capacity of those open working areas fronting the working face will be so great that the front of the columns of air in the entering headings will pass not one-thirtieth of the way but almost up to the working face. (See Fig 2 where solid pillars in place of ribs with sealed openings are shown going almost up to the face and so carrying in the air the entire distance.)

Where the room necks along the headings are sealed, the air entering under an increased atmospheric pressure will continue to travel in the headings until it reaches the end of such sealing which conceivably will be at the far end of the room-entry pillars that are being withdrawn. Such sealed areas usually have an opening or openings, and the air will swing back into these because of the increased pressure. This rear travel, of cours,e is desirable, but the previous advance, which makes it possible, brings the air nearer the mine's "hideaway" or would-be "safety zone" and diffusion (to be explained later) accordingly will work havoc.

Besides, the slowness of the retrogression toward the goafs and the large volumes of air seeking that accommodation will make the air travel further into the mine where accommodation will be more readily obtained. Resistance does not prevent air movement, it merely delays it and the time table should, if at all possible, be read "Goafs first, open headings second and room openings last." It would be better if bad air were removed to the goafs as soon as possible through the several room necks that it is obliged to pass in its trip toward the face. By closing all the side channels except the room faces all the bad air might find lodgment at the face. But such sealing near the working face, of course is neither contemplated nor attempted, and, of course, undesirable.

Little Air But Long Travel

Air Prefers to Travel Headings—Hence, most of the air needed to supply the one-thirtieth contraction of the enormous coal-extracted areas passes through all the several headings of the entry and not through the caved areas. In consequence, this bad air may be moved not a tenth of a mile but perhaps almost three miles, and the air travels quite rapidly that distance (See Fig. 2). But, in any event it can't reach the face unless the heading extends that far, except by real ventilation or by a much slower method, "diffusion," which perhaps might be termed "mixation," "permeation" or "scatteration." (See Fig. 3). Diffusion is the natural mixing of one gas with another by its passage in all directions through the other gas. This always occurs between gases of unequal weight per cubic foot, but a cubic foot of carbon monoxide has so nearly the same weight as a cubic foot of air that it is slow indeed to diffuse.

Only by making the gas thus entered by diffusion increase in volume is a mass movement created in the gas entered. As the quantity of carbon monoxide entering is very small, the mass movement created by diffusion is negligible, even where the mixing itself would be enough to menace the lives of men if exposed to it.

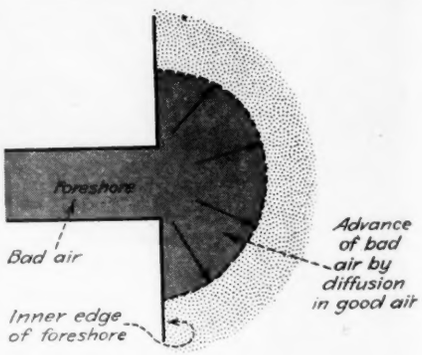

Fig. 3—Diffusion mixes one gas with another with little mass movement especially when little gas is diffused, as is the case with carbon monoxide. One percent of carbon monoxide, horribly lethal as it is, produces little movement.

Ventilation Is Difficult to Suppress—However, any real ventilation, no matter how feeble, will drive bad air in, if there is any bad air to be driven in, and it will drive as much good air out. For this reason, ventilation must be entirely suppressed. Opening a door or breaking down a brattice in a single crosscut will not prevent circulation entirely, nor will closing a single door in the heading or headings stop it. To make absolutely sure that the air cannot circulate, several crosscuts between the associated headings must be opened and many doors in the headings must be closed.

It must be remembered that an open cross-cut between headings affords only a second, though shorter, passage in which the air can travel, a passage that, being at right angles to the former line of travel, does not have the benefit of the momentum of the speeding air. The air is propelled through the crosscut solely by the differences of pressure of the air in intake and return. It starts on the new course with no intrinsic energy. On the other hand, the air in the intake heading is helped to continue on its course by the power of its momentum.

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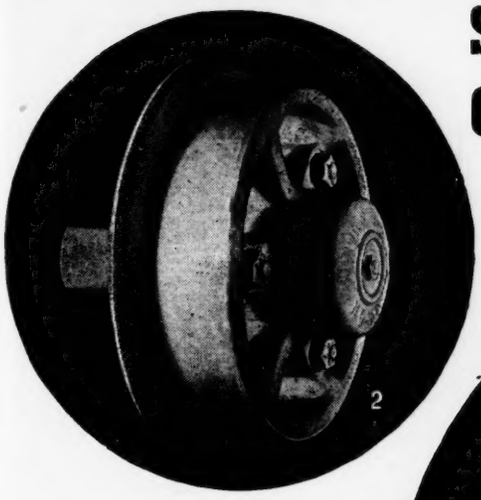

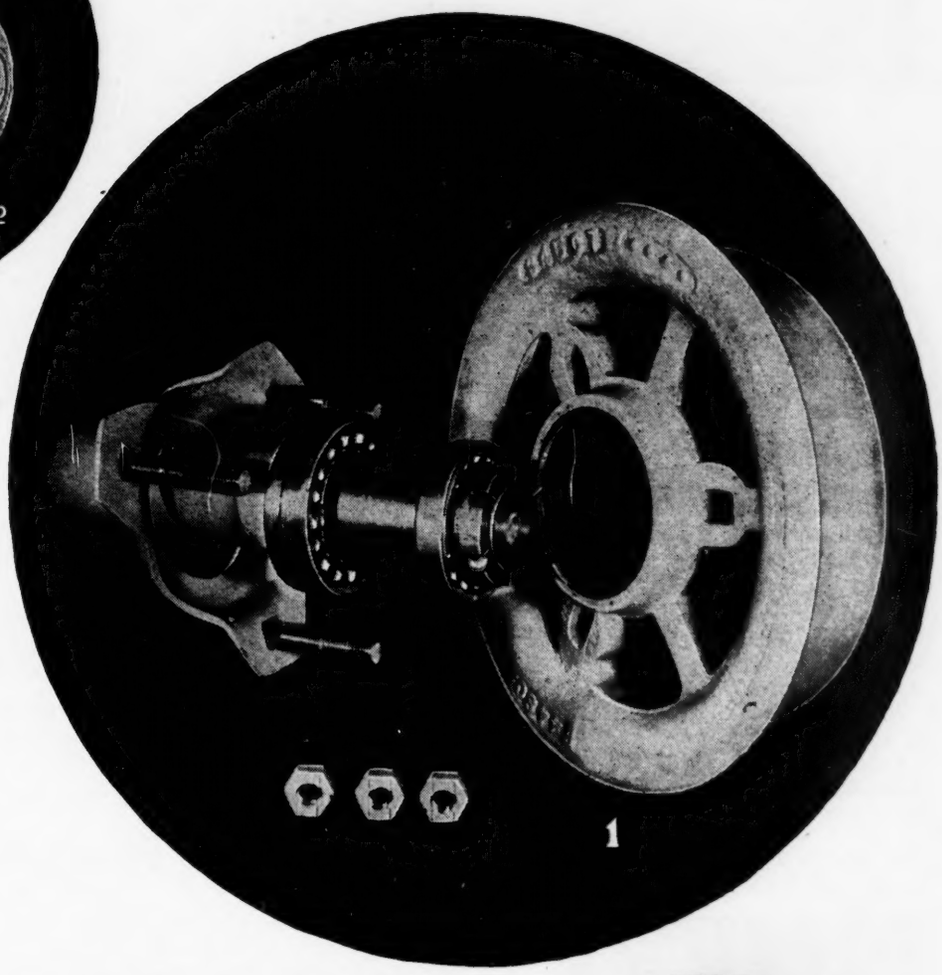

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The illustrations on this page show how simple it is to demount the "Floater". Photo 1 shows how the bearings remain on axle in perfect adjustment when wheel is removed. Photo 2 and 3 show the front and rear of the wheel and how it is held in place with only 3 bolts. This simplicity of design makes it possible to remove and replace the "Floater" as easily and quickly as changing an automobile wheel.

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Operating Ideas

Overburden Auger Reduces Tipple Labor

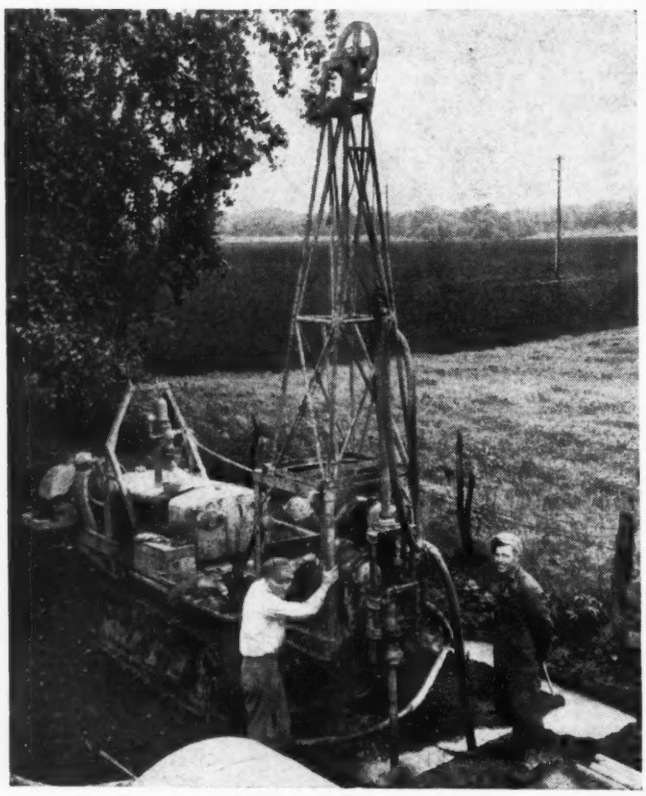
WHY SHOULD SPILLAGE from coal-handling equipment be shoveled by hand if installation of mechanical means would prove cheaper? To officials of the Bussey strip mine, Dunreath Coal Co., Bussey, Iowa, the answer was clear and inertia did not prevent action for long. Now, spillage under a plate feeder and under the bottom end of an apron conveyor is automatically loaded back onto the conveyor.

This job is at the railroad tipple and, more specifically, under the truck-dump hopper which is at ground level and from which the coal is elevated by apron conveyor to the top of the tipple. A 6-ft. section of auger (see illustration) is mounted in a 4-in. pipe with a wide slot cut away along the top to carry the spillage out through a hole cut in one side of the foundation wall. A steel plate was installed to guide the spillage down to the auger.

Outside the wall, a 4-in. by 10-ft. flight conveyor was installed to carry the fine coal up to a short chute, down which it slides onto the apron conveyor. Both the auger and small conveyor are driven from the shaft of the tail sprockets of the main conveyor.

Looking back under the tail end of the apron conveyor. The auger moves the spillage out through a hole in the foundation at the left.

Mud Pump Facilitates Prospecting



A MUD PUMP on the prospecting drill cuts down the consumption of clear water per hole, states W. E. Parks, editor of Mecco News, Midland Electric Coal Corp., Farmington, Illinois.

The rotary-type core drill, shown in the accompanying illustration, has drilled more than 35,000 ft. of holes in prospecting work during the past two years. It is used every day at the Farmington plant. The drill is built to reach locations usually inaccessible to the conventional type of drilling equipment. The unit consists of a No. 12 Sullivan oil-hydraulic drill head mounted on the rear of a Model 35 Caterpillar gasoline tractor. The drill head is powered through a V-belt drive from the main drive shaft of the tractor. The oil pump for the hydraulic system is driven by a sprocket chain also from this drive shaft. The derrick over the drill head is raised hydraulically.

The 4x5-in. Gardner-Denver mud pump is driven by V-belts from a power take-off with a clutch on the front end of the tractor. This mud pump recirculates the same water back to the hole after the cuttings have settled out in a settling sump. This saves on the use of clean water.

Because of its mobility, writes Mr. Parks, the rig is sometimes used as a tractor to pull the water truck out of a muddy field. At other times when it was impossible to get water to the drill rig, the tractor pulls the water tank to a nearby creek or pond. Here the tank was filled by using the slush pump on the drill rig. Then the tractor pulls the tank back to the drill hole and the drilling operation is continued.

This core drill has drilled 35,000 ft. of holes in the past two years. Operating the rig are Walter Dikeman (left) and George Sampson.

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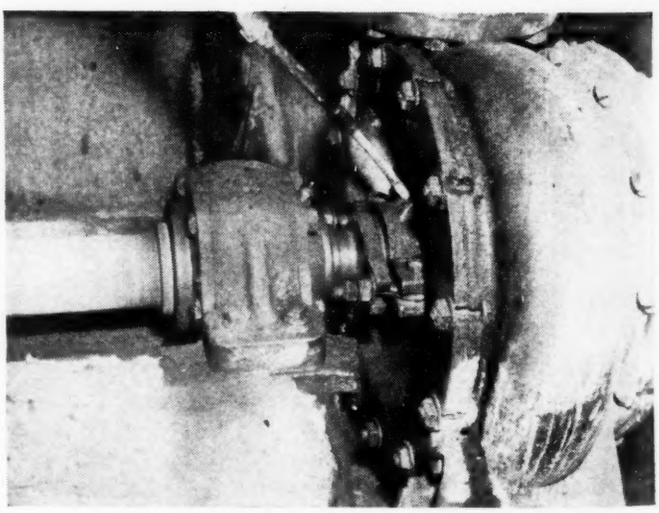
"Skeetow" Helps Miners Up the Hill

Adopting the popular method used by ski resorts to assist skiers to the top of the run, the Jones & Laughlin Steel Corp. has installed for its coal miners a "skeetow" at the company's Vesta-Shannopin Coal Division No. 5 mine in Washington County, Pa. The device is an escalator-style endless cable moving slowly above a weather-protected macadam path. Assisted by looped ropes hanging from the cable overhead, the men easily walk up a hillside to their parked cars or residences when they come out of the mine after a day's work. The idea for this "assist" to tired workers occurred to H. E. Lewis, president of J&L, one day as he watched the miners toiling up a steep, rough path on the hillside and the arrangement illustrated was the result.

Change to Grease Lubrication Improves Pumps

SUBSTITUTING grease for oil in anti-friction bearings in pillow blocks of circulating pumps in the coal-washing plant at Red Ember strip mine of the Truax-Traer Coal Co., Fiatt, Ill., has saved bearing renewals and much daily labor. The difficulty was caused by water leaking from pump packing glands and traveling along the shaft into the bearing. There it would emulsify with the oil in the bearing and oil cellar and cause bearing failures. Draining the oil every night and renewing with fresh was the practice for some time but did not completely eliminate the trouble.

The effective preventive was replacing the oil plug with a pressure-gun fitting and going to the use of the same General Electric motor grease used in anti-friction bearings or motors throughout the plant. This change was made on both pillow blocks of the three circulating pumps. The grease appears to be effective in keeping water out of those bearings near the packing glands.



With grease in these pillow-block bearings instead of oil, water leaking from packing glands no longer causes bearing failures.

THE CLOSED SHOP

Key to Labor Monopoly

IF THE PEOPLE of the United States are to loosen the monopoly control now exercised by some segments of union labor and recapture the power to control their own economic and political destiny, they must come to grips with the problem of the closed shop. A satisfactory solution of that problem is as vital to the interests of the wage earner, who should be fully protected in his right to organize and bargain collectively through representatives of his own choosing, as it is vital to the interests of the nation as a whole.

By the closed shop, which unfortunately is a term that seems to shed more heat than light, I mean any shop in which the worker must make his peace with a union in order to have a job. There are approximately 13½ million union members in the United States. Of these about 10 million are governed by arrangements calling for "closed" shops, union shops, maintenance of membership provisions and similar devices which make good standing in a union a condition to holding a job.

Such arrangements raise serious issues about what is commonly presumed to be the basic American right to work. Also, closed shop arrangements lie at the root of the dominant economic power now exercised by some labor leaders.

The problem of reducing the power of these labor leaders to proportions that make it safe for democracy is the age-old problem of monopoly. In an earlier era this problem was created largely by businessmen who sought to escape the restraints of competition by combinations or agreements to control prices and production. Such efforts are still attempted and must be curbed by law.

Union Labor Monopoly

But, after more than a decade during which a monopoly position for organized labor has been aggressively promoted by the federal government, the major monopolists today are those labor leaders who wield the power of enormous nationwide unions. About 90% of the soft coal miners do the bidding of John L. Lewis. A like percentage of the auto workers are represented by the United Automobile Workers of the C. I. O. About 80% of the production workers in steel are members of the United Steel Workers, C. I. O. No single corporation has more than a fraction of the economic power that is concentrated in these unions. And if corporations were to combine their power to cope effectively with that of these union monopolies they would unquestionably find themselves charged with violating the federal antitrust laws.

In its national sweep, the monopoly power of unions rests largely on their exemption from the federal antitrust laws. My previous editorial in this series (the 53rd) discussed the desirability of removing that exemption. The local roots of this monopoly power are often embedded in closed shop arrangements.

Closed Shop in Coal

An illuminating case in point is provided by the United Mine Workers, whose leader John L. Lewis has graciously given the country a 3½-month reprieve from "the hysteria and frenzy of an economic crisis," as he himself termed it. During that latest crisis the dispatches from the soft coal fields reported that the miners were standing behind John L. Lewis almost to a man. And the implication usually was that the driving forces of the strike were loyalty to Lewis and the prospect of economic gain.

Underlying that performance, however, and basic to it was an agreement in the soft coal fields providing that "as a condition of employment all employees shall be members of the United Mine Workers." Hence to hold a job in 90% of the soft coal industry which is governed by contracts with the United Mine Workers, a miner must not offend the union. To avoid offense the union member must even be careful in criticising what his union

does. *Suspension from the union for six months, and hence from the right to hold a job,* is the penalty imposed by the United Mine Workers constitution for circulating a statement "wrongfully condemning any decision rendered by any officer of the organization."

The willingness of the miners to follow Lewis until the country froze over was not, of course, exclusively a product of the agreement limiting jobs in the coal fields to union members of good standing. Some of it originated in bad handling of employee relations in the coal fields in years gone by. But the fact remains that Lewis' soft coal monopoly has as one of its principal foundations an agreement which gives the United Mine Workers a job-or-no-job hold on 90% of the soft coal miners.

In its extreme form, the closed shop not only makes union membership a condition of employment but narrowly limits the numbers admitted to union membership and hence to the opportunity to work. In this way it is used to enforce restriction of output and working rules which would never stand up under free competition.

Fair Dealing

The closed shop raises major issues of personal freedom and fair dealing between individuals. As matters now stand, closed shop agreements require employers to discharge workers who lose their good standing in the unions involved. At the same time they frequently impose no requirement on unions to grant membership to law abiding and technically qualified persons. Many unions with closed shop agreements refuse to grant membership on the basis of competence. Thus, qualified workers are denied a fair chance to hold a job.

In its dealings with the closed shop issue the federal government has been pushed into a self-contradictory position. The National Labor Relations Act (the Wagner Act) provides, and properly, that "employees shall have the right . . . to bargain collectively through representatives of their own choosing." In furtherance of that basic proposition, the Wagner Act also provides that "It shall be an unfair labor practice for an employer . . . by discrimination in regard to hire or tenure of employment to encourage or discourage membership in any labor organization . . ." Standing alone, the provision would clearly outlaw the closed shop.

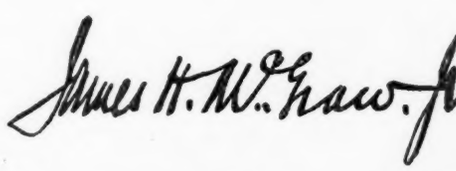
But then, to favor the closed shop, the Wagner Act turns right around and provides that "nothing in this Act . . . shall preclude an employer from making an agreement with a labor organization . . . to require, as a condition of employment, membership therein," provided that certain conditions of representation are fulfilled. This places the National Labor Relations Board in the impossible position of trying to administer a law which simultaneously points in opposite directions.

In successfully contending that there should be no closed shop arrangements on the railroads, the late Joseph Eastman, Federal Co-ordinator of Transportation, said, "If genuine freedom of choice is to be the basis of labor relations under the Railway Labor Act, as it should be, then the yellow dog contract and his corollary, the closed shop . . . have no place in the picture." The so-called yellow dog contract, which requires a worker to agree not to join a union as a condition of employment, has long since been outlawed.

At one time the closed shop was defended as a protective device for feeble young unions struggling against predatory employers. But a mere glance over the current economic scene discloses that the time when that argument was supported by the facts is past. Now it is the labor leaders who frequently exercise decisive economic power.

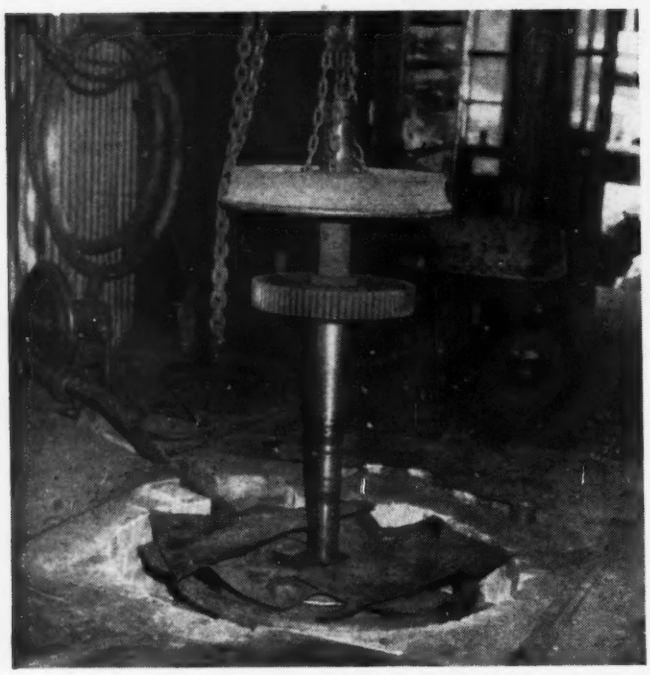
At elections in November three more states, Arizona, Nebraska and South Dakota, passed constitutional amendments outlawing the closed shop. In doing so, they joined six other states, which, in one way or another, have restricted the closed shop. The South Dakota amendment presented the basic issue created by the closed shop in simple and direct terms when it declared that "The right of persons to work shall not be denied or abridged on account of membership or non-membership in any labor union, or labor organization."

That issue must be squarely faced by the new Congress if its first order of business, the labor crisis, is to be resolved.



President McGraw-Hill Publishing Company, Inc.

Tire-Annealing Pit Added To Automatic Welding Outfit



SINCE 1937 an automatic arc welding machine in the Powellton, W. Va. shop of the Eastern Gas & Fuel Associates, Koppers Coal Division, has been kept busy building up worn locomotive tires. For several years, the practice was to put the tires into service without annealing. As a safety precaution, however, it was later decided to relieve the heat strains by annealing.

The annealing pit recently built is shown in the accompanying illustration. It is sunk in the floor of the welding shop and is fitted with sliding steel covers flush with the floor. Natural gas is the fuel and the burners are rings of 2-in. pipe, one for each size of tire or wheel. The blower supplying air is located against the wall and two extra burners are hanging above it. Gas enters the burner feed pipe just outby the blower.

A welded tire or wheel is brought to cherry red in the annealing pit after which the burner is turned off and the pit covered. Heat held by the fire brick lining results in slow cooling. Six hours is the standard time for leaving a tire in after the burner is turned off.

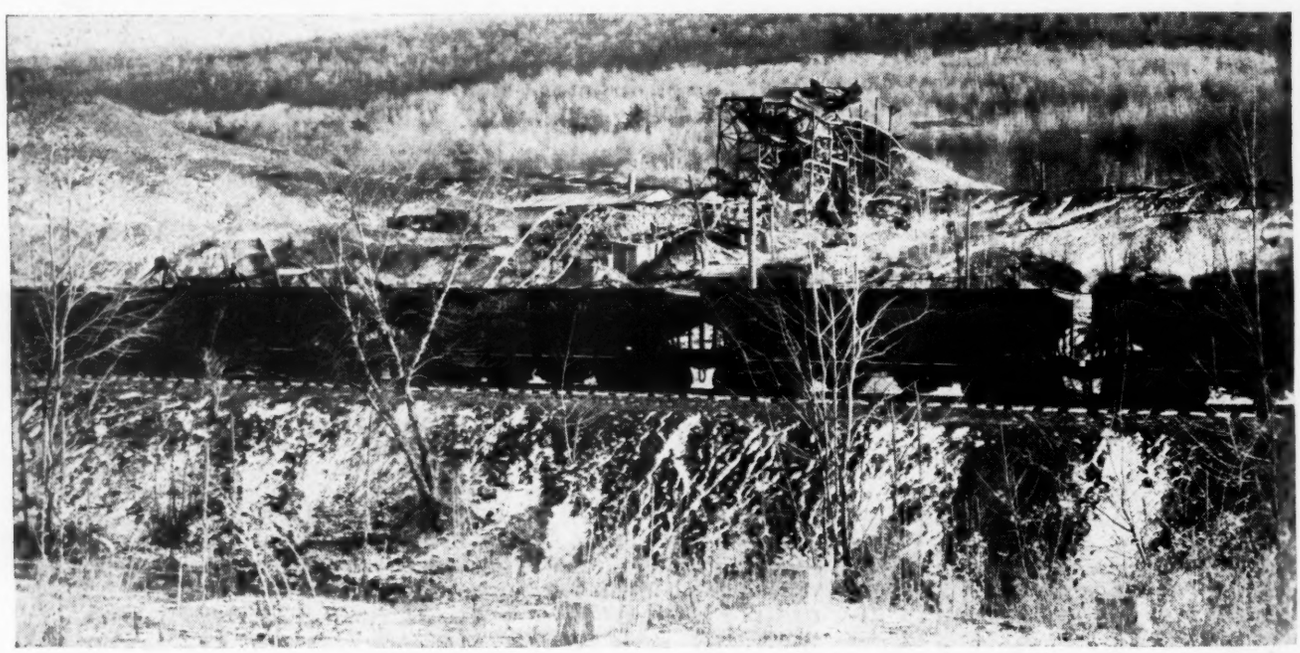
Supported by the crane the welded tire is in place in the annealing pit with several pieces of scrap steel plate laid over it to help confine the heat.

Planning Helps Equipment Cut Fire Hazard

THE PLAN underlying fire prevention work at the Red Ember mine of the Truax-Traer Coal Co., Fiatt, Ill., as related by Byron Somers, superintendent, makes sure that experienced men are on hand during the time of greatest hazard. Red Ember equipment includes all that is found at most progressive operations—fire hose, high-pressure pumps and portable extinguishers for use on both oil and electrical fires. A watchman makes the rounds of all surface buildings at specified intervals after the plant has stopped operation. However, when it comes to fighting a fire the mechanics are the mine's first line of defense.

Maintenance work goes on three shifts a day, seven days a week at Red Ember. Mechanics are always working in the garage and shop. Repairmen, usually four per shift, are working in the tipple on both the second and third shifts. Consequently, when a fire is discovered in one of the surface buildings something can be done about it immediately—not just a report made on it over the telephone to someone miles away and helpless to act quickly. The maintenance men (all able-bodied individuals) know where the fire stations are, how to start the pumps, where the valves are located, where the nearest extinguisher hangs—and can set about to work on the blaze in the early minutes of its discovery.

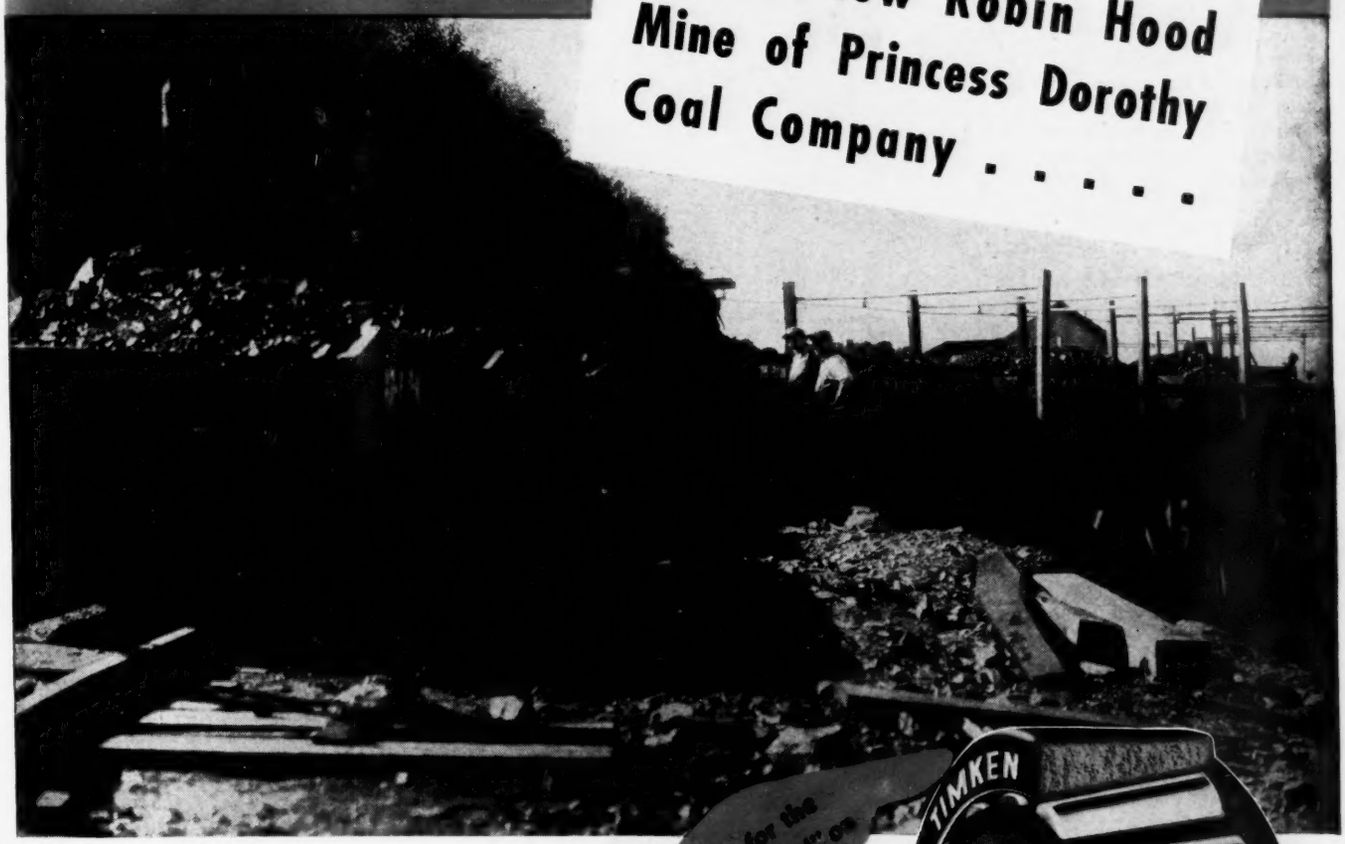
Thus, scheduling some of the maintenance work for both the second and third shifts provides Red Ember with better fire protection at practically no extra cost. It is an inexpensive way of providing extra fire protection at the hours when the hazards are greatest.



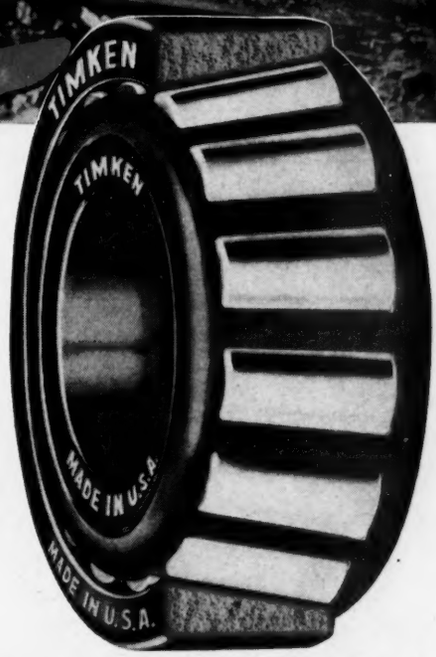
Planning to have experienced men available with modern equipment reduces the chances of a disaster such as this—not at Red Ember, incidentally.

A Heavy Trip Rolls Easily On TIMKEN BEARINGS

At the new Robin Hood Mine of Princess Dorothy Coal Company . . . . .



WARNING: Look for the Trade-Mark "TIMKEN" on every bearing you use.



Robin Hood Mine is located in Boone County, W. Va. It is a new property, having been in production only little more than a year.

All cars used in this mine are of the drop bottom type built by American Car & Foundry Company. There are 50 large cars like those shown in the photograph and 50 smaller cars, all equipped with Timken Tapered Roller Bearings. A good idea of the size and capacity of the large cars is afforded by comparison of the cars with the men in the picture.

Princess Dorothy Coal Company, Eunice, W. Va. has operated Timken Bearing Equipped mine cars for years, hence their selection of Timken Bearings for the Robin Hood Mine. The Timken Roller Bearing Company, Canton 6, Ohio.

TIMKEN

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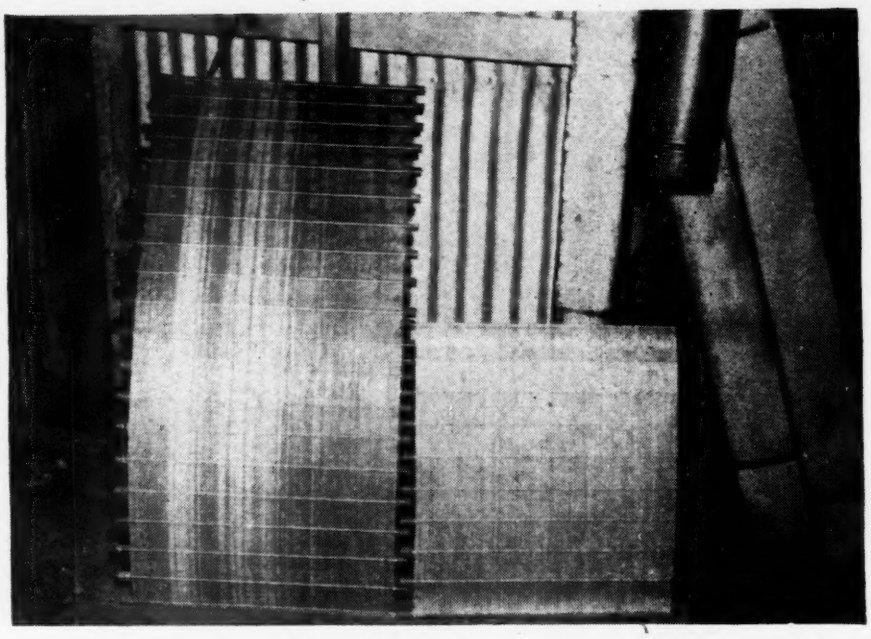
TAPERED ROLLER BEARINGS

Rubber Mountings Stop Screen-Frame Breakage

THREE TIMES the life of old-style screen jackets is being secured from new rubber-mounted sections adopted for a vibrating screen dewatering minus ¼-in. coal from a Rheolaveur launder in the washing plant at Red Ember mine of the Truax-Traer Coal Co., Fiatt, Ill.

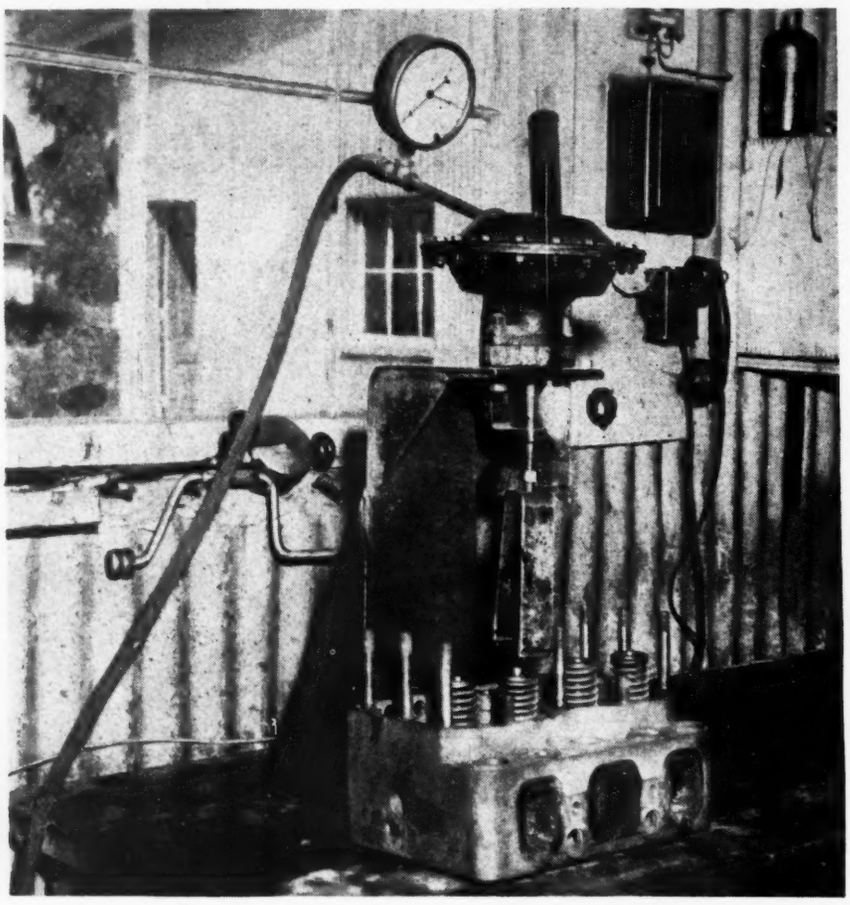
The screen is a Robins "Eliptex." Originally, the stainless-steel cloth was supported in individual frames 24x24 and 24x48 in. The frames of these sections broke before the wires were badly worn. Spare sections of the new type, also with stainless steel cloth and made by Bixby-Zimmer, are shown in the illustration. The rubber covered ends of the cross rods fit into slots in the main frame of the vibrator. The rod ends of adjoining sections are staggered, as indicated by the positions in which the two spare sections were arranged for the illustration. The attachment is effected by bolting a narrow strip over the top of the joint.

Original framed sections lasted from 30 to 90 days. The new ones last about nine months. By that time the cloth is worn out. Lighter weight is another advantageous characteristic of the new screen sections.



Spare rubber-mounted stainless steel sections in the parts room. The new type frame insures full life from the cloth.

Air-Operated Spring Compressor Found Indispensable

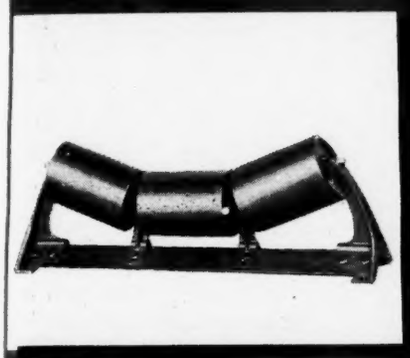


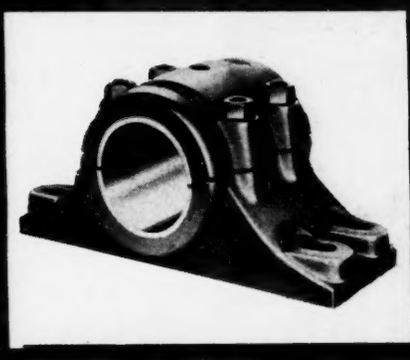
PREVENTING finger injuries is reason enough for installing any special tool or machine in the mine maintenance shop. When the new tool enables one man to do what previously required two, it is truly a real improvement. In the garage and maintenance shop at the Red Ember strip mine of the Truax-Traer Coal Co., Fiatt, Ill., an air-powered valve-spring compressor was substituted for the old mechanical tool which, unless it was kept in excellent condition and very carefully handled, was prone to slip and catch the fingers.

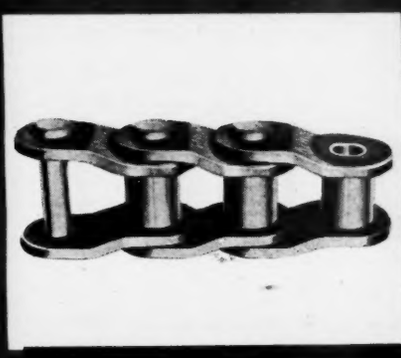
The illustration shows a Cummins diesel engine head on the bench, or anvil, of the tool and shows the yoke in place above the valve ready to compress the spring when air pressure is turned into the diaphragm above. The tool is used both for dismantling and assembly.

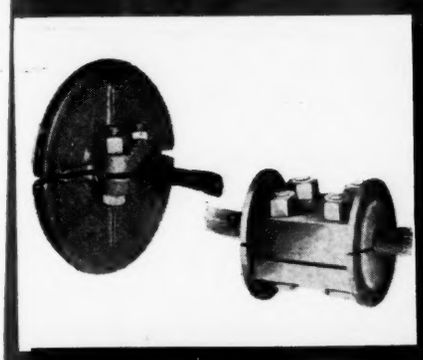
The diaphragm is from the air-brake equipment of a coal truck used at the mine. Likewise, the control valve, which is on the floor, is the foot valve from a truck. The yoke hanging on the stem has a hole in the center to allow the valve stem to go through and give access for handling the spring keepers. A thread and double-nut adjustment on the diaphragm rod permits using the machine for two other engines, the LeRoi and Caterpillar, both of which are used on other equipment at the mine.

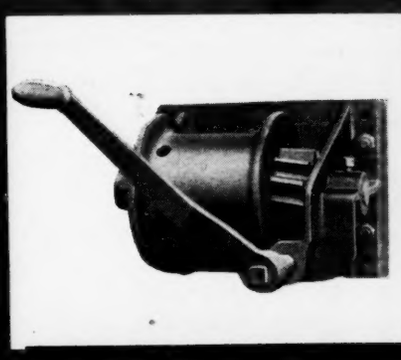
One man holding his foot on an air valve to actuate the diaphragm can dismantle or assemble the spring keepers with ease and safety.

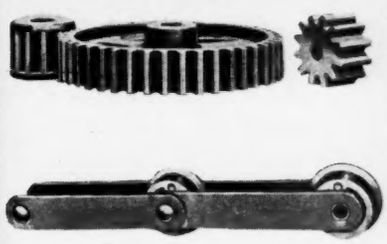


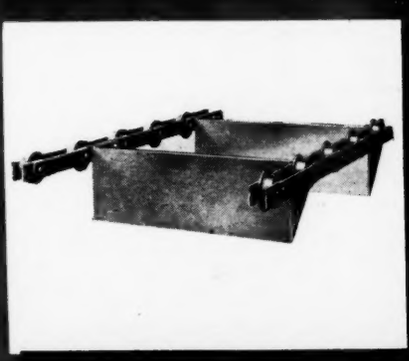


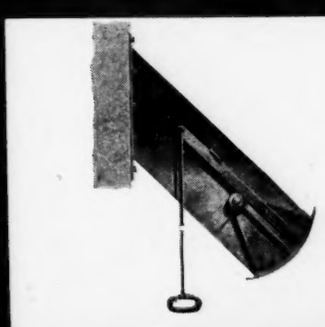












Replacement parts for tipple equipment . . . the same high quality as originals they replace, plus recent metallurgical improvements.

. . . when re[illegible] are necessary

JEFFREY

ESTABLISHED 1877

Doors in Pans Drop Balled-Up Wet Coal from Lower Run

Balled-up wet coal is dropped through this opening as the pan goes around the bottom sprocket on the lower run. Hinged doors, hanging down out of sight in this illustration, close by gravity as the pan moves to the top run.

HOLES CUT in two of the pans of an elevating apron conveyor and fitted with trap doors acting as check valves eliminated trouble from wet coal balling up and fouling at the bottom sprockets. This conveyor is in use at Red Ember strip mine of the Truax-Traer Coal Co., Fiatt, Ill. It elevates mine-run coal from the truck-dump hopper to railroad cars.

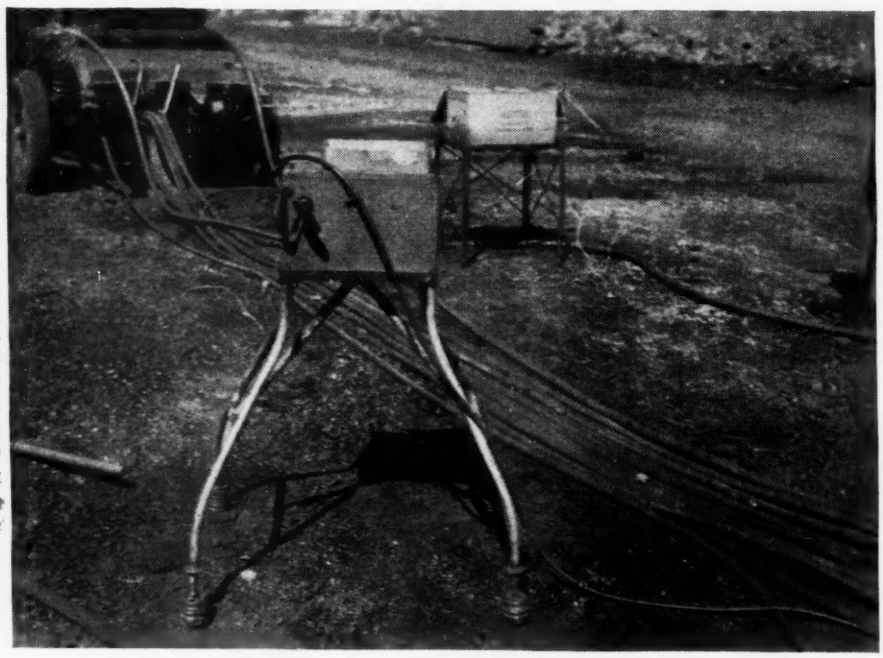
The accompanying illustration shows how the holes are wide open during the time the relief pan is traveling the bottom run. The door is hinged at the near edge and is hanging down out of sight. As this door-equipped pan travels around the bottom sprocket any dirt that has accumulated there will fall through, and as the pan starts on the top run the door closes by gravity and the pan is ready to carry the coal delivered to the conveyor by the feeder.

The conveyor is 6 ft. wide and is heavily loaded. Each pan has a cast-iron shoe in the center which, while traveling the upper run, slides on a wooden rail, acting as a support to prevent the centers of the pans springing down. The length of this elevating conveyor is 40 ft. between centers. Each of the relief pans has two doors, one on each side of the center shoe. Bars welded across the openings tend to strengthen the weakened pan and support the closed doors when the conveyor is loaded.

Magneto Stand Rests on Glass Insulators

SOME ACCIDENTS are caused by a chain of peculiar and unusual circumstances and if any one link had been missing there would have been no accident. Glass insulators on the feet of a light-weight portable magneto stand and cabinet used for electric blasting caps in the Red Ember strip pit of Truax-Traer Coal Co., Fiatt, Ill., could possibly be the missing link and so are considered a worthwhile safety feature.

The stand top is just large enough to hold a wooden box containing the shooting magneto and includes pocket space in the back large enough for an extra box of caps. This equipment is used in shooting coal and so is very often standing close to 440-volt three-phase a.c. trailing cables which supply the compressor of air-driven coal drills. In some cases a stand may also be near the 4,000-volt trailing cable that supplies a stripping or loading shovel. The glass insulators are telephone type and are good for at least 1,000 volts.



Here the stand is in an operating position close to the 440-volt trailing cables of a coal-drilling compressor. Feet are renewable glass insulators.

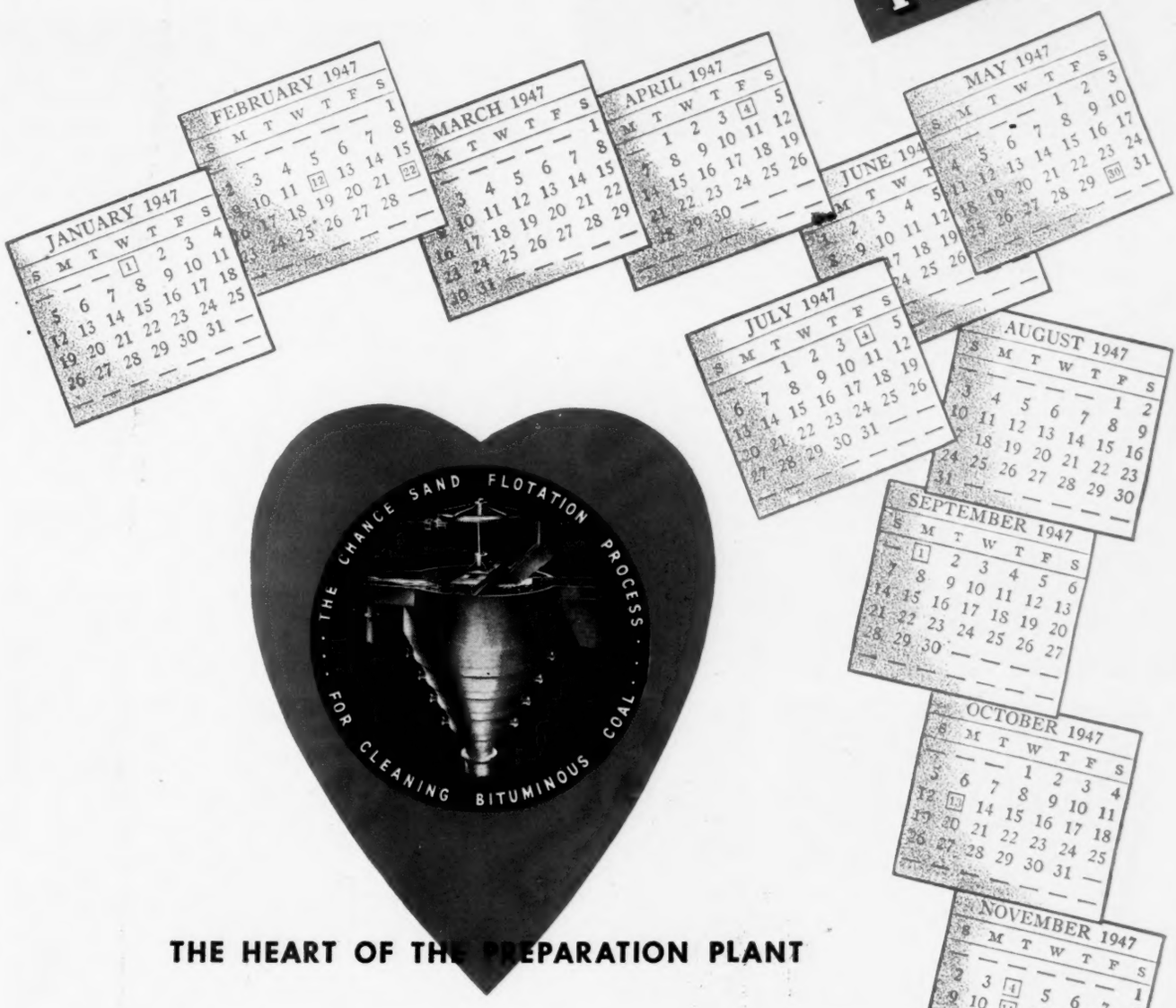
Are Your Operating Ideas Helping to Set New Records?

Operating ideas are helping to establish records everyday. Some help to set higher production figures. Others help reduce the cost of maintenance and thereby increase the availability of equipment. And others, help to establish better safey records. But these ideas, all laudable ones, should find their way to Coal Age's "Operating Mart," where others could copy and thus the entire industry be benefitted.

We will arrange to give you the credit and pay besides. However, since you're busy, we don't expect the drawing for that idea to be letter perfect; nor must the description of it be free of grammatical errors. You send the idea and we'll attend to the details. If accepted, Coal Age, upon publication, will pay you $5 or more for each mechanical electrical, operating or safety idea.

CHECK AHEAD ON YOUR PREPARATION METHODS

AND COSTS FOR EACH MONTH IN 1947



THE HEART OF THE PREPARATION PLANT

Many bituminous operators, who employ the CHANCE SAND FLOTATION PROCESS in cleaning coals, have: 1. Reduced picking cost, 2. Cut losses in rejects, 3. Stepped up production. These are only three of the many savings realized by users of the CHANCE SAND FLOTATION PROCESS. These savings are just as possible with the Chance Process cleaning your coal.

United Engineers & Constructors Inc

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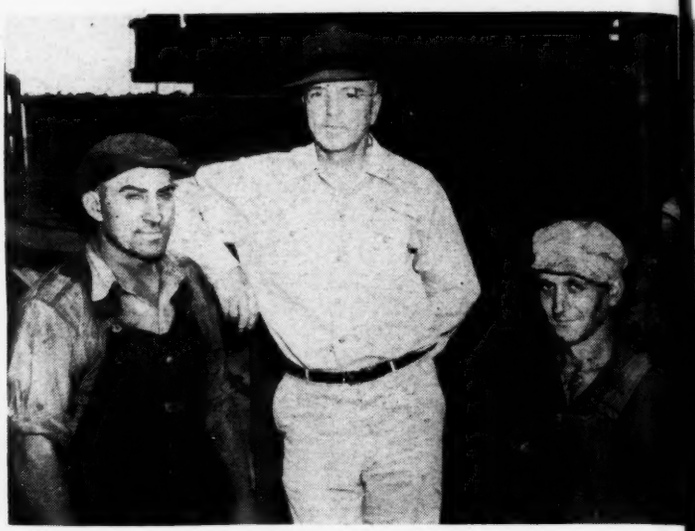
COAL MEN

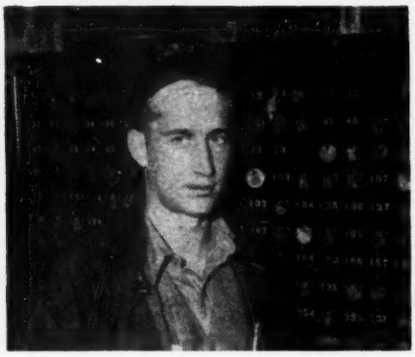
August Mason (left), pit boss, and Jay McConville, maintenance department, Dunreath Coal Co., Bussey, Iowa.



E. C. Truby (left), top foreman, No. 3 mine, J. R. Hamm, president and general manager, and Erney Boban, No. 3 mine, Sunshine Coal Co., Centerville, Iowa.

At left—Clifford Plumb (left), assistant chief engineer; Sam Fratto, safety manager, and George Jackson, general superintendent, Independent Coal & Coke Co., Kenilworth, Utah, with L. L. Arnett, Utah State inspector.

James Cummings, superintendent of Mines Nos. 2 & 4, Christian Colliery Co., Mahan, W. Va.



W. O. Barnard Jr., time study engineer, Arkwright mine, Consolidation Coal Co. (W. Va.).

F. H. Brooks, superintendent, Arkwright mine, Consolidation Coal Co. (W. Va).

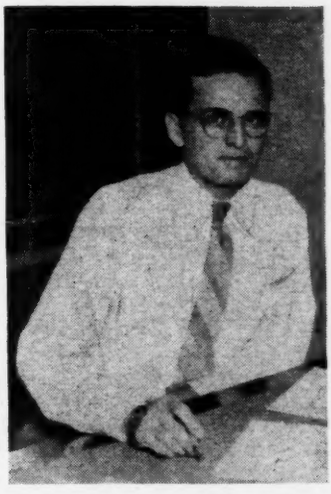
Ellis Axelson (left) and Clyde Campbell, rock men; Clement Audin Jr., outside foreman; Ralph Audin, master mechanic; Clement Audin Sr., manager; and Abel Audin, mine foreman, Hawk's Nest mine, Champion Coal Mining Co., Somerset, Colo.

Carel Robinson of Robinson & Robinson, consulting engineers, Charleston, W. Va.

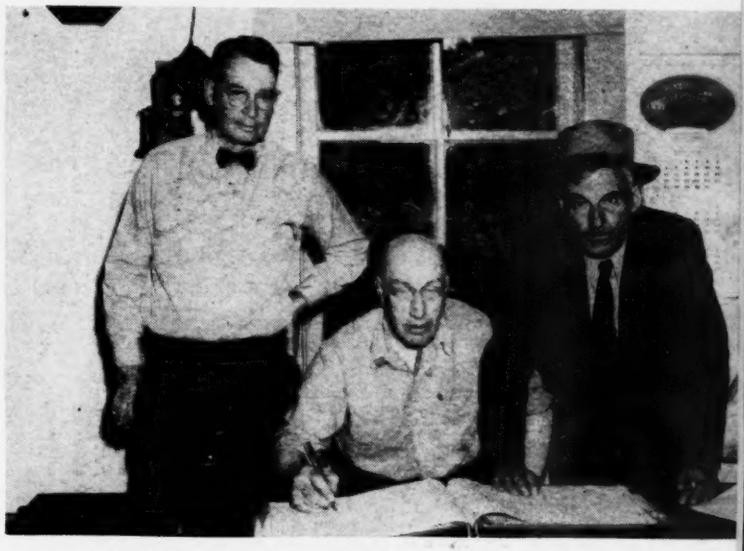
ON THE JOB

W. R. Perfater (left), safety engineer, West Virginia division, R L. Cochrane, superintendent, and J. M. Bishop, chemist, Shamrock mine, Truax-Traer Coal Co., Kayford, W. Va.

Russell Wilmot, asst. supt., Piney Fork (Ohio) No. 1 mine, Jefferson Coal Co.



Robert A. Lewis, field engineer, Oglebay, Norton & Co., snapped at his desk in Charleston, W.Va.

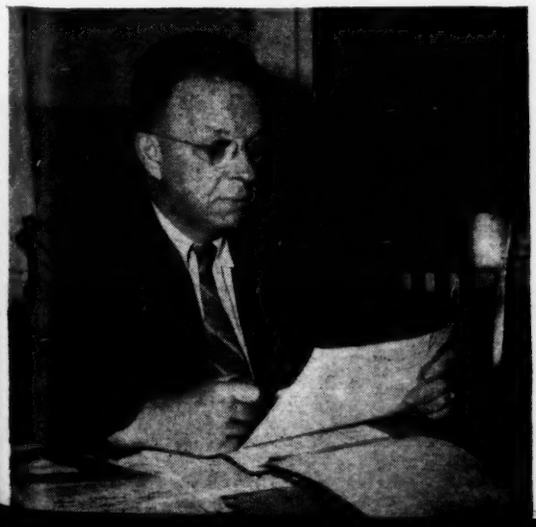


George L. Kimball (left), mine clerk; C. A. Bernard, warehouseman, Brilliant mine; and J. R Barber, chief enginer, St. Louis, Rocky Mountain & Pacific Co., Raton, N. M.

Steve Williams (left), tipple foreman; with Victor and Dominic Tassinazzi, Brilliant mine, St. Louis, Rocky Mountain & Pacific Co., Brilliant, N. M.

W. M. Chapman (left), chief electrician, and R. F. Overly, general superintendent Christian Colliery Co., Mahan, W. Va.

F. L. Zollinger, superintendent, Loree Nos. 2, 3, 4 & 5 and Boston collieries, The Hudson Coal Co., Scranton, Pa.



Clarence Spragg, superintendent, Mine No. 97, Consolidation Coal Co. of West Virginia, Rivesville, W. Va.

C. P. Anderson, Jr., secretary-treasurer and sales manager, Mary Frances Coal Co., Mt. Hope, W. Va.

COSTS STEP DOWN! TONNAGE STEPS UP!

WHEREVER Cincinnati Chains, Double Ended Reversible Bits and Cutter Bars are used Tonnage has STEPPED UP and Costs have STEPPED DOWN. Cincinnati Trouble Free Time Tested Chains, Bits and Bars not only outwear other equipment but save valuable man hours as well. Service work is reduced to a minimum . . . bit setting time is lowered and production moves along without costly delays. In addition, Cincinnati Coal Cutting Equipment uses less power. Cincinnati Chains are made of fine alloy steel, carefully heat treated and drop forged and engineered to place greatest stress and wear on easily replaceable long life parts. Offset rising production costs with "Cincinnati Mine" . . . manufacturers of sturdy, dependable, efficient, well engineered coal cutting equipment.

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News Round-Up

Operators' Negotiating Group Split; Supreme Court Broadens Lewis' Case

After more than three years of unified action in negotiations with the U.M.W., the bituminous operators negotiating committee Dec. 19 was apparently split, at least for the present, by failure of the Northern and Southern groups to agree on the timing of new negotiations for a contract with the union. The Northern Appalachian group, representing 60 percent of the nation's tonnage, offered to begin talks with Lewis immediately, while the Southern and Western operator representatives stood firm in refusing to act until after Lewis' contempt case is heard before the Supreme Court and Congress has a chance to act on expected labor legislation. After a session that lasted into the evening without a break, the committee adjourned sine die.

In a statement to the press after the meeting, Charles O'Neill, head of the Northern Appalachian group, said: "The Northern Appalachian operators at this meeting were ready to affirm their statement that they are willing to enter in good faith with the union to make an agreement. The 'captive' mines are also willing. So are the operators of Illinois, Indiana and others in the North. We were unable to get an agreement on our statement at this meeting. We are willing to go that far in response to the statement of Mr. Lewis that he was willing to enter into negotiations at any mutually agreed-on date."

Mr. O'Neill further explained, in response to questions from reporters, that separate negotiations with the union by the Northern group "depends upon Mr. Lewis," and that his group would not ask the miners to commit themselves in any way before a joint conference.

The position of the Southern operators was outlined in a statement read by Henry Warden, vice president and general manager, American Coal Co. of Allegany County, McComas, W. Va., in which he said: "There is no change in our position of willingness to negotiate an agreement to cover the operations of our mines. However, Mr. Lewis has stated in his letter f Dec. 7 to the membership of the U.M.W. that 'if and when such negotiations ensue our representatives will act in full protection of your interests within the limitations of the findings of the Supreme Court of the United States.'

"In view of the above statement of Mr. Lewis and other very important considerations which are of major importance to the entire country we are of the considered opinion that the operators should not propose the opening of negotiations now."

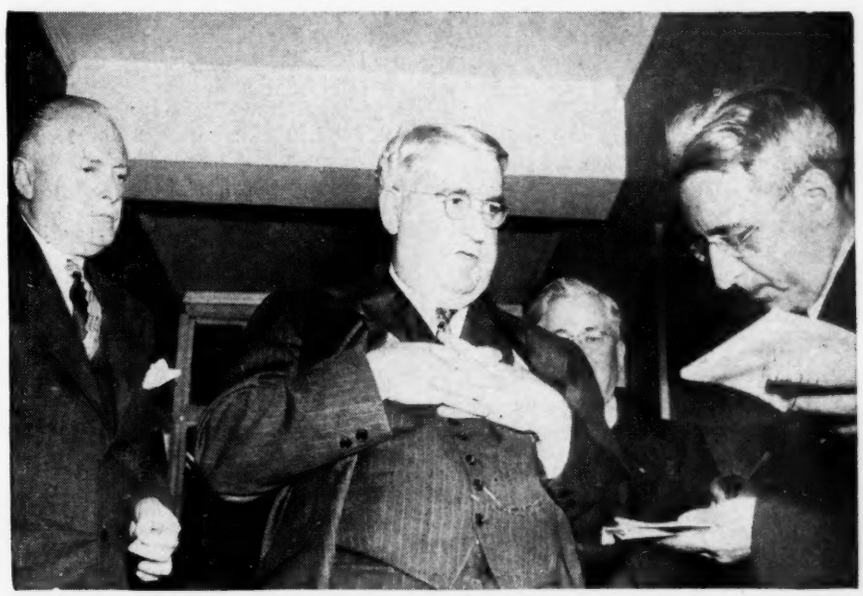
In amplifying the reference to "other very important considerations." Mr. Warden spoke of the entire subject of labor relations, which will be up for Congressional action soon, changes in the Wagner Act and status of foremen and pointed out that the dispute over the termination of the Krug-Lewis contract was still in the courts. "We feel that we are on the sidelines," Mr. Warden said.

"We do not want to interfere in a situation which we did not bring about," he continued. "We are not trying to block anything. It is entirely a question of timing. It is not our move." Should other parts of the industry make an agreement with the union, he explained, his group would either make an agreement or continue under government control.

Lewis' Appeals Consolidated

A thorough review by the Supreme Court of the many legal aspects involved in the contempt conviction of John L. Lewis and the U.M.W. was expected when the hearings on the union's appeal opened Jan. 14. During the month the Supreme Court accepted for review several petitions by the union, all designed to broaden the case and provide answers to the various points raised by the union during the trial before Judge Goldsborough.

On Dec. 16 the Court agreed to hear a ten-point appeal filed by Lewis and the U.M.W., which covered the following: (1) Did the District Court have jurisdiction under the first and thirteenth amendments to the Constitution to issue the restraining order of Nov. 18? (2) Did the Court have jurisdiction under the Norris-La Guardia Act and the Clayton Act to isssue that order? (3) Did the Court have jurisdiction to extend the ex parte temporary restraining order of Nov. 18 without consent of the defendants? (4) Is a temporary restraining order issued without jurisdiction or authority a nullity which can be disregarded with impunity? Assuming that it cannot be so disregarded, was it not mandatory in these cases to have a trial by jury? (5) Was the rule to show cause sufficient to sustain a judgment in criminal contempt? (6) Were the status and interests of the Government in this case such as to permit a judgment in civil contempt? (7) Did the District Court err in admitting prejudicial and irrelevant testimony during the trial? (8) Can the U.M.W., an unincorporated association, be held responsible for criminal acts of any individual officer in absence of proof of



Charles O'Neill (center), head of the Northern Appalachian operators group, explains the position of his organization to newspaper men. George F. Campbell, president of the Old Ben Coal Corp. and head of the Illinois Coal Producers' Association, is at the left.

participation or ratification of such acts? (9) Are the fines excessive and repugnant to the fifth and eighth amendments to the Constitution? (10) May civil and criminal contempts be tried simultaneously under a single rule to show cause?

The Supreme Court announced Dec. 23 that it had agreed to consolidate with these appeals additional petitions on Judge Goldsborough's restraining order of Nov. 18, his extension of that order and his issuance of a temporary injunction. Petitions for writs covering the Government's side of the case had already been granted by the Court Dec. 9. In the meantime Judge Goldsborough agreed, on request by both parties, to postpone ruling on whether the U.M.W. had the right to cancel the Krug-Lewis contract, until at least ten days after the Supreme Court hears the case.

J. & L. Foremen's Appeal Denied

Another round in its case to prevent the unionization of foremen was lost by the Jones & Laughlin Steel Corp. when the U. S. Court of Appeals for the District of Columbia Dec. 16 upheld the Government's right to make a contract with unionized foremen in four of J. & L.'s mines under government control. The decision affirmed an order of June 26 by Judge Jennings Bailey of the District Court denying the company a preliminary injunction to set aside the agreement between the CMA and the U.M.W. until a court test of such an agreement was made.

In the ruling the Court of Appeals made it clear that it was passing only on the authority of the Government "to establish changes in terms and conditions of employment in mines under its possession." While it was not ruling on the propriety of the NLRB certification of the union's bargaining status, it did state, however, that it agreed with the NLRB view that a supervisor's membership in a rank-and-file union "would not interfere with proper enforcement of safety regulations."

It was expected that Jones & Laughlin would continue the case to the Supreme Court. Further clarification of the foremen-unionization question was seen in the announcement by the Supreme Court Dec. 9 that it would review the Packard Motor Car Co. case appealing against a NLRB ruling that foremen employed by that company constitute a bargaining unit. In this case, however, the union representing the foremen is entirely separate from the unions representing the rank-and-file workers.

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New Developments

Opening of a new strip mine with a planned capacity of 5,000 tons daily near Lexington, Perry County, Ohio, by the Snyder and Swanson interests, of Pittsburgh, was reported last month. Production was slated to begin shortly after the first of the year and the Hocking No. 6 seam is to be mined. Construction of a new cleaning plant also is planned. Cliff H. Snyder and A. E. Lamm are reported to be in active charge of the new operation.

Large-scale strip- and deep-mine development of a tract at the head of Bennett's Valley in the Mountain Run area of Pennsylvania was expected shortly with the purchase from Emmett J. Rupert of Sykesville, Pa., of 3,300 acres of coal lands by Cornish & Dickerson of Altoona. Control of several adjoining plots bring the area to be developed to 4,500 acres. Several veins of 40 to 48 in. are to be mined, according to reports, with stripping planned to mine veins seven to 17 ft. under the surface. Deeper veins are to be later mined by underground methods.

Sale of the coal rights to 340 acres near Elkville, Ill., to the Truax-Traer Coal Co. has been announced by Thomas Endsley. Truax-Traer was reported to be planning to mine the area by slope methods. The United Electric Coal Cos. is said to have purchased the 160-acre Reinheimer farm north of its Red Ray strip mine, south of Freeburg, Ill., for stripping purposes.

William Gunning and D. Siddens, formerly connected with the Consolidation Coal Co. (Ky.), are reported to have organized the Jacob's Fork Coal Corp., which has purchased the stock of the Splash Dam Coal Corp., Splash Dam, Va. A portion of the land being mined by the Splash Dam Corp. is owned by the Clinchfield Coal Corp.

Reopening of a mine at Cummock, Lee County, N. C., closed since 1927, recently was announced by Walter Bledsoe & Co. A daily capacity of 500 tons is planned.

The Ohio Power Co., Newark, Ohio, was recently authorized by the SEC to purchase not more than 12,500 shares of $100-par capital stock of the Central Ohio Coal Co., which operates a strip mine on land owned by the Ohio Power Co. According to the report, the money will be used by the coal company to purchase additional mining equipment and to add to working capital.

The Mahoning Construction Co. is reported to have purchased all the outstanding stock of the East Fairfield Coal Co., Columbiana, Ohio. Assets acquired include stripping equipment and several parcels of land. Robert B. Marshall is president, and L. E. Brauninger is secretary-treasurer of Mahoning Construction.

Plans for a $1,000,000 development in Pictou County, Nova Scotia, reportedly were being pushed by miner and industry representatives last month. Part of the two-fold project is the opening of the first fully mechanized colliery in the Province. With an estimated life of 25 years, the new mine will tap the McBean seam, a 5,000,000-ton coal reserve, giving jobs to at least 200 miners when it starts production by next autumn. The other half of the project is a coal-washing plant, capable of turning the new colliery's production into 800 tons of clean coal daily, as well as handling the 1,600 tons a day from other mines in the area.

Plans for the opening of a new mine with an annual capacity of 2,000,000 tons, 26 miles from Massilon, Ohio, recently were announced by Earl J. Jones, president, Muskingum Coal Co., Zanesville, Ohio. The operation will be located on the Wheeling & Lake Erie R.R. and 18,000 acres of coal lands is available for development. The production anticipated is to equal that of the company's Misco mine.

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All Rail Rates Upped by I.C.C.

Increases in rail and water carriers' freight rates averaging 17.6 percent, effective after Jan. 1, 1947 at the railroads' discretion, were authorized Dec. 6 by the Interstate Commerce Commission to offset higher wages and increased costs of materials and supplies. The increase in revenue is estimated to total $1,000,000,000 a year. Interim increases of 6½ percent granted June 20, were ordered cancelled when the new rates become effective.

Rate increases on bituminous, anthracite and coke are as follows: up 15c. per net ton or 17c. per gross ton, as rated, on all rates up to and including $1.00 per ton; up 25c. per net ton or 28c. per gross ton, as rated, on rates over $1.00 and not over $2.25 per ton; up 30c. per net ton or 34c.

Coal Activity

Bituminous Coal Stocks

	Thousands Net Tons Nov. 1, 1946	P.c. change From Oct. 1, 1946	P.c. change From Nov. 1, 1945
Electric power utilities	15,638	+7.4	+3.3
Byproduct coke ovens	6,593	+11.3	+79.3
Steel and rolling mills	1,024	+19.8	+86.8
Railroads (Class I)	9,274	+5.4	+8.9
Other industrials*	19,155	+1.7	+34.0
Retail dealers	3,392	−.3	−20.7
Total	55,076	+5.2	+14.6

Bituminous Coal Consumption

	Thousands Net Tons Oct., 1946	P.c. change From Sept., 1946	P.c. change From Oct., 1945
Electric power utilities	6,708	+6.8	+20.5
Byproduct coke ovens	7,814	+3.1	+38.9
Steel and rolling mills	828	+14.2	+3.7
Railroads (Class I)	9,571	+8.9	+1.2
Other industrials*	11,741	+10.0	+12.2
Retail dealer deliveries	9,984	+19.1	+11.7
Total	46,646	+10.0	+13.5

* Includes beehive coke ovens, manufactured-gas plants and cement mills.

Bituminous Production

November, 1946, net tons	37,390,000
P.c. change from October, 1946	−34.5
Jan.-Nov., 1946, net tons	486,014,000
P.c. change from Jan.-Nov., 1945	−8.3

Anthracite Production

November, 1946, net tons	4,990,000
P.c. change from October, 1946	−7.7
Jan.-Nov., 1946, net tons	55,605,000
P.c. change from Jan.-Nov., 1945	+9.1

Sales, Domestic Stokers Vs. Oil Burners

	Stokers	Oil Burners
October, 1946	17,502	64,458
P.c. change from Oct., 1945	−5.6	+133.3
Jan.-Oct., 1946	157,553	355,941
P.c. change from Jan.-Oct., 1945	+84.7	+248.0

Index of Business Activity*

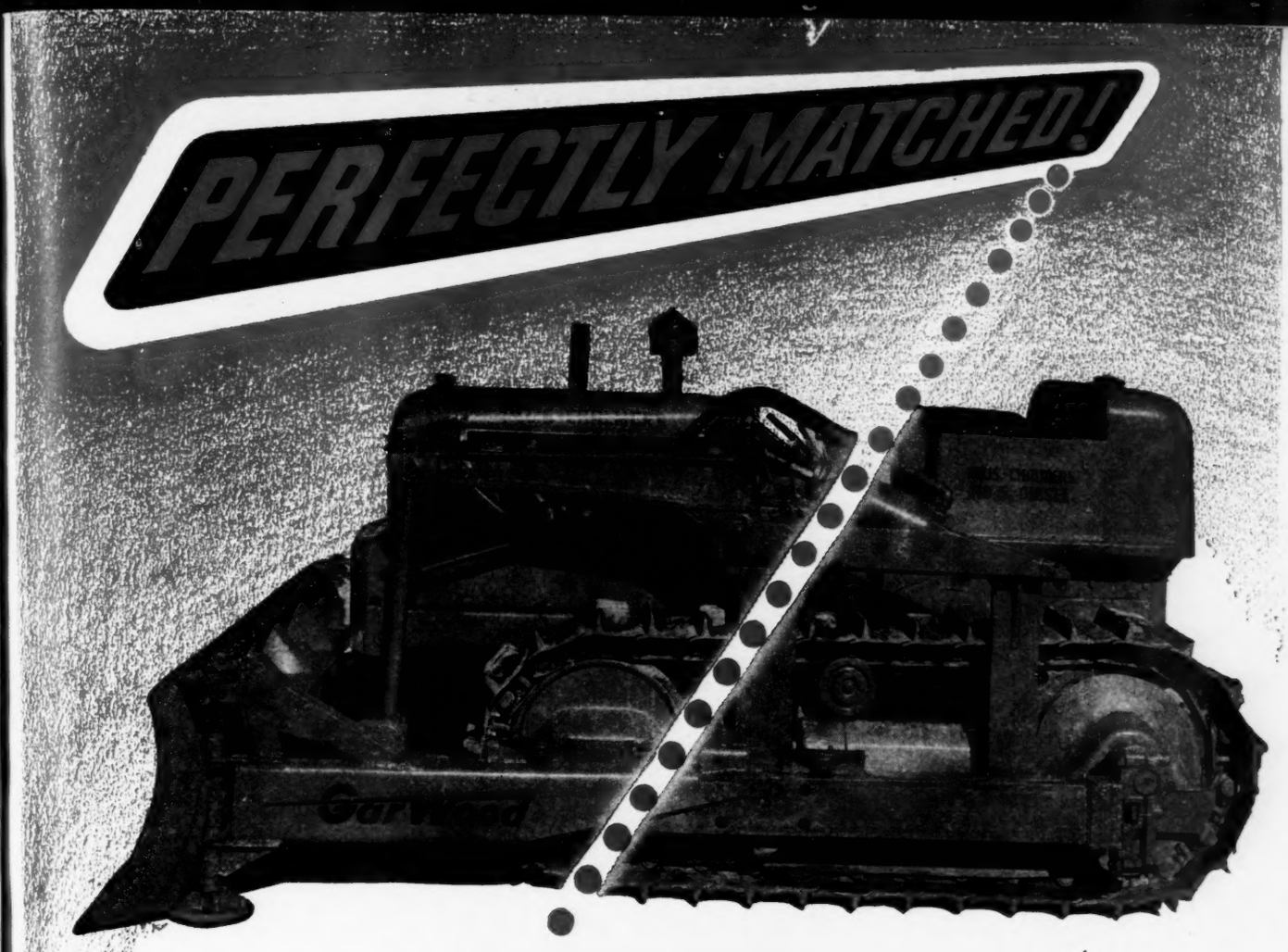
Week ended Dec. 21	187.7
Month earlier	186.3
Year earlier	173.2

* *Business Week*, Dec. 28.

Electric Power Output†

Week ended Dec. 21 kw.-hr.	4,940,000,000
P.c. change from month earlier	+5.1
P.c. change from year earlier	+16.5

† Edison Electric Institute.



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Specially Designed and Balanced Equipment by GarWood

When it comes to *real,* down to earth *engineering* in small packages . . . you just can't beat the brand new, *specially* designed and balanced Gar Wood Equipment for the new Allis Chalmers HD-5 Tractor.

For here is a combination that's engineered and built expressly for *years* of dependable, rugged, smooth-functioning *work.* Perfectly-balanced earth-moving *brawn* that means more profit to you! And what's more . . . it's a combination that's *built to take a beating* . . . under the *worst* possible conditions . . . on the toughest jobs!

Want proof? Ask the men who've been using Gar Wood Road Building Equipment all over the world. Ask *them* about Gar Wood quality and dependable operation *when and where it counts.* Then consider: this is newly designed, exactly-engineered, quality-built Gar Wood Equipment.

And then . . . for your own good . . . specify Gar Wood!

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per gross ton, as rated, on rates over $2.25 per ton. On lignite, one-half of the preceding amounts may be applied to the basic rates. When coal and coke are transported by water, preceded and followed by rail transportation, or transported by rail at a combination of two separate established rates, the aggregate amount of the two rail factors shall be considered the basic rate to be increased as provided above and subjected to a single increase as authorized.

The freight-rate boost compared with a 25 percent increase asked by the railroads. The ICC order also permitted indefinite extension of the 10-percent increase in passenger fares granted Feb. 10, 1942. The passenger rate boost formerly was due to expire six months after the declared end of the war.

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Stripping Ordinance Considered Invalid

A Daviess County, Indiana, ordinance giving the county planning commission full authority over mining licenses for specified areas within the county has been ruled invalid by Attorney General James A. Emmert of Indiana. He also ruled that the State statutes supercede the county ordinance in cases involving "permissive" use of lands for strip mining where coal is taken in excess of 250 tons annually, declaring that the Daviess County ordinance and the State statutes are in conflict in this particular.

He notified the State conservation department that it could not be immediately determined whether the ordinance was a valid police regulation. It was pointed out that while the opinion issued applies only to Daviess County, it would have application to other county planning commissions in the State under similar conditions.

In the case of Daviess County, the ordinance authorized the county planning commission to designate certain districts as strip, slope or shaft mining areas. The county ordinance could not "arbitrarily discriminate between strip-mining and shaft-mining operations," he said.

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Christmas Turkeys Boost Safety Record

Exemplary safety records won Christmas turkeys for approximately 1,900 miners of the Pittsburgh Coal Co., it was announced Dec. 20 by Reese H. Nicholas, director of safety. The turkeys were distributed by the company on Christmas eve to each miner who worked without injury, "reasonably steady," and at a mine that produced more than 50,000 tons of coal for each compensable injury for the year ending Nov. 30.

The winners were employed at the Solar, Warden, Westland, Montour 10, Lindley, Mathies, Euclid and Champion No. 1 mines. "We feel that the interest shown by the employees helped to maintain a good accident record in most of the mines," Mr. Nicholas reported. "We are continuing the system and hope the number of awards for 1947 will be doubled."

Powdered Coal Offers Automatic Home Heat

Automatic home heating from powdered coal is developing as a byproduct of the gas turbine for railroad locomotives recently announced by the Locomotive Development Committee of Bituminous Coal Research, Inc., and is now coming out of the laboratory for testing as a business venture. If a commercial success, it opens a new vista for clean, simple and smokeless heating without bother to the householder, who would do no handling, shoveling nor ash removing. Waste gases would be vented off through an exhaust pipe or up the chimney. The "push-button" warmth would be regulated by the same thermostatic controls used for oil or gas burners.

This test of commercial practicability of powdered coal for automatic home heating is being undertaken by William B. Rogers of Baltimore, a coal wholesaler of many years experience and at one time manager of the fuel-oil department of an oil refiner. He has formed a company which is erecting a central plant on a railroad siding for pulverizing bituminous slack in volume.

Initially, the automatic-heating units will be placed in small commercial establishments doing canning, bottling, dry cleaning, baking and such for serving steam boilers of 75 to 150 hp., using an aggregate of 6,000 tons of coal a year.

Thereafter, Mr. Rogers proposes to sell the multi-family and individual home-heating business, as a merchant operating on an annual heating-service contract basis. Although his system is adaptable to existing furnaces, a special furnace of house-size capacity, a vertical sheet metal cylinder lined with refractory, is to be available. Top-mounting of the powdered-coal burner provides for vertical down-firing after ignition by a gas pilot and sparkplug. A screw conveyor at the bottom of the airtight hopper brings the fluffy black dust to the blower for carburetion into the air stream going into the burner. A small take-off line from the blower gusts secondary air into the flaming chamber for more complete combustion.

Calculated on the basis of a six-family apartment building in Baltimore, Md., the fuel cost of pulverized coal would approximate $315 a year, according to Mr. Rogers. This would be appreciably less than competitive gas and oil fuels. Mr. Rogers also claims that considerable savings would be effected over the hand-fired or stoker-fired coal burners. While installation cost of $500 for the heating unit looks high, no janitor is needed and the customer pays nothing directly for maintenance and depreciation. Savings on these should pay for the furnace installation in about three years, Mr. Rogers believes.

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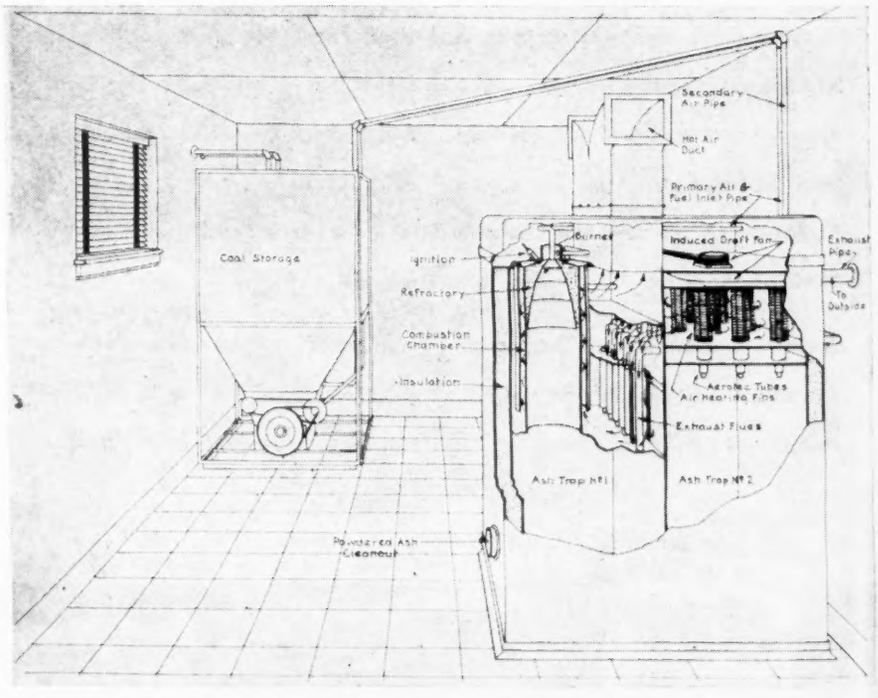
Big Inch Lines Start Flow to East

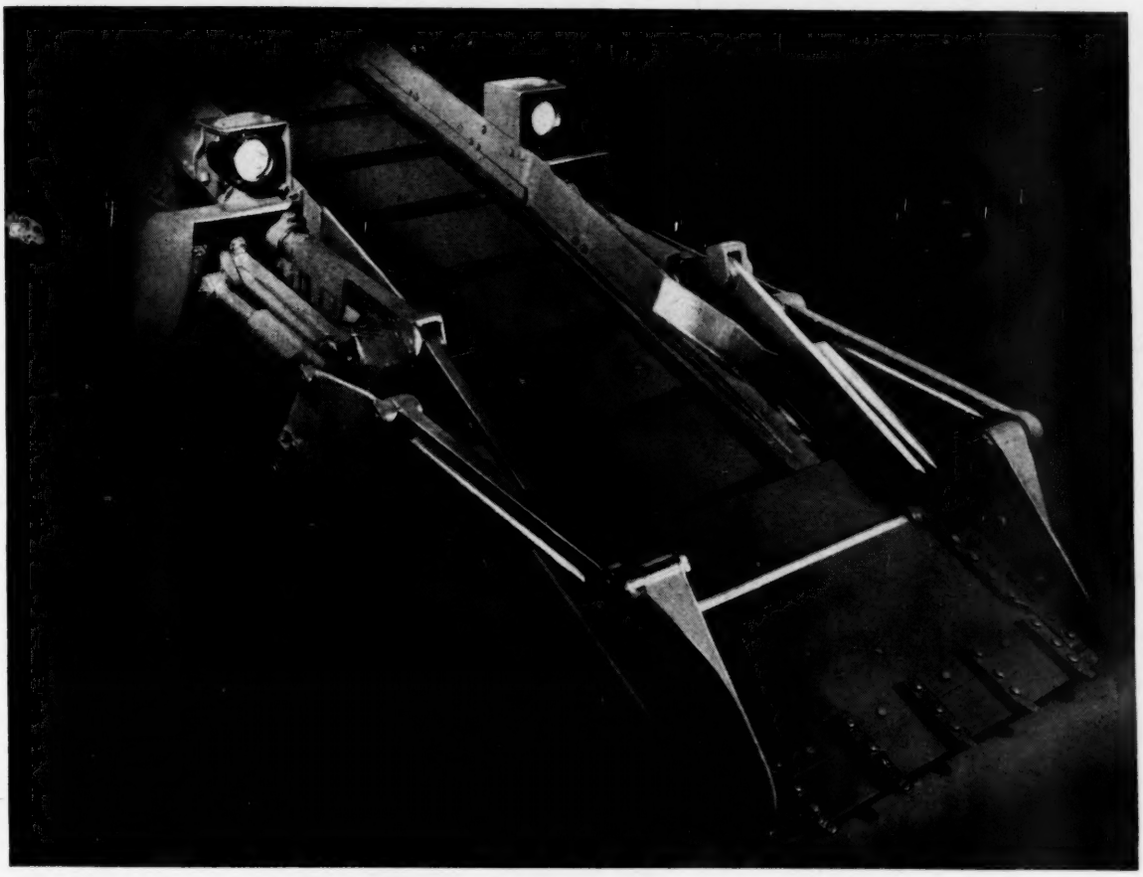
First deliveries of natural gas through the Little Inch pipeline were made in Ohio Dec. 10 and gas started flowing through the Big Inch line eastward from Texas Dec. 9. Use of the two pipelines for natural-gas transmission was authorized by the government to combat the bituminous shortage created by the coal strike that began Nov. 20. The Tennessee Gas & Transmission Co. received from the War Assets Administration a temporary permit to operate the lines until April 30, 1947. Initial traffic was at the rate of about 50,000,000 cu.ft. a day, with expectations of 150,000,000 cu.ft. daily within six weeks.

Meanwhile, the Federal Power Commis-



Proposed automatic-heat installation using powdered coal planned for multi-family apartment houses and homes.

YOU'LL GET MORE SERVICE-ABILITY OUT OF A WHALEY "AUTOMAT"



Any operator about to buy a loader is quite naturally interested in service-ability. That's why we urge you to investigate the Whaley "Automat" with its many advantages for speed, safety, efficiency and economy.

IT'S FAST! The continuous automatic shovel action of the "Automat" with its 6 to 7 tons loading capacity per minute, easily averages 3 tons per minute of material loaded.

IT'S SAFE! The "Automat" vertical shovel action permits operation in narrow entries without danger of knocking out timbers or injuring men.

IT'S EFFICIENT! Shovel works close to bottom but will not take soft bottom. Complete clean up is assured. The parallel lift rear conveyor is easily adjustable for height of car and a real advantage in close roof conditions. And, bear in mind, the "Automat" will consistently load any lump of coal that will pass through your tipple, any lump of rock your cars, aerial tram, or larries can take.

IT'S ECONOMICAL! The "Automat" gives you maximum production at minimum power consumption—with its one 25 H.P. Motor using only 1/5 KWH per ton of material loaded.

Only the Whaley "Automat" gives you all of these important features, that's why it will pay you to consider this practical machine before you choose a loader. Myers-Whaley Co., Knoxville 6, Tennessee.

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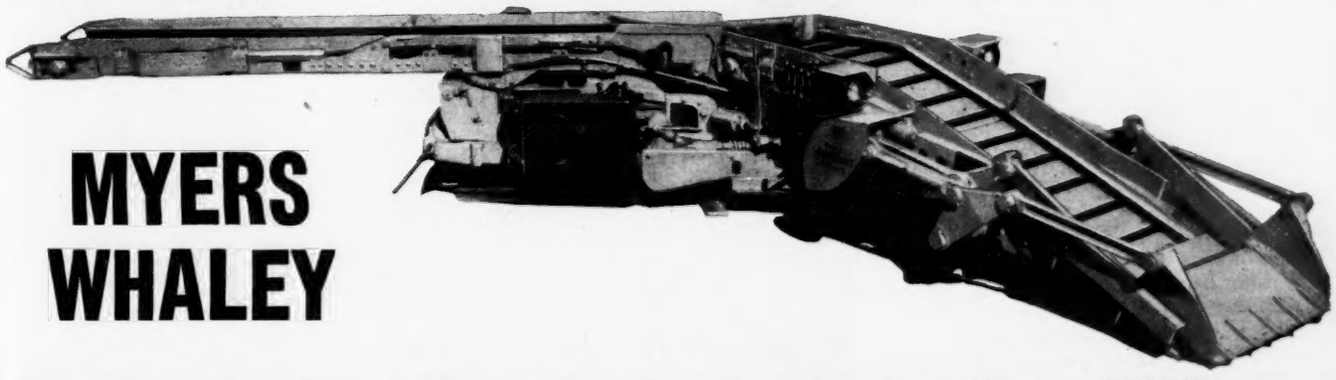


MYERS WHALEY

Mechanical Loaders Exclusively For Over 39 Years

sion authorized construction of an entirely new natural-gas pipeline by the Michigan-Wisconsin Pipeline Co. at a cost of $53,000,000. The line will reach from Texas fields to Wisconsin, Iowa, Missouri and Michigan. Authorization to build a $130,000,000-pipeline from Texas to serve outlets in New York, Pennsylvania, New Jersey, Delaware and Maryland was asked of the FPC Dec. 21 by the Trans-Continental Gas Pipe Line Co., Inc. The company stated that it had already negotiated contracts with utilities in those areas for sale of 325,000,000 cu.ft. daily.

BCR Research Expanded for 1947

Continued faith in the future of the bituminous coal industry was evidenced last month by the board of directors of Bituminous Coal Research, Inc., in approving a budget of $447,200 for its general program of cooperative research and development projects to be carried on during 1947. This program is in addition to large expenditures planned in 1947 for coal-burning gas-turbine locomotive research and development by the BCR Locomotive Development Committee.

Howard N. Eavenson, president of BCR, announced that this budget was higher by $72,200 than the allotment made for research in 1946. The funds are made possible by voluntary contributions from coal companies and associations, coal-carrying railroads and coal-burning equipment manufacturers.

As in 1946, the new BCR program will be an expansion as well as a continuation of development work begun earlier. In 1947, Dr. Harold J. Rose, vice president and director of research, stated, BCR projects will include six on railroad locomotive utilization of coal, 15 on residential uses, eight on industrial steam and non-steam uses and two on mining and preparation.

Residential uses—including smokeless stoves, ranges, boilers, water heaters and warm air furnaces, stokers, chimneys, improved designs for homes heated with bituminous coal and ash-handling methods—again will receive major attention from the organization. A great deal of the BCR laboratory work on residential uses will be carried on at Battelle Memorial Institute, Columbus, Ohio, and the BCR study on planning and designing for home heating with coal will continue at the University of Illinois, Urbana, Ill.

New BCR projects in the locomotive field include front-end cinder collection and disposal and investigations by a special steam locomotive performance sub-committee. Work will continue on air supply for locomotives, overfire air jets to eliminate smoke, effect of fuel on locomotive performance and handling locomotive coal to minimize breakage. The principal research will be done in the fuels division of Battelle Memorial Institute.

The industrial steam and non-steam uses, which also will be handled at Battelle, include overfire air for fuel beds, stoker and boiler-furnace designs and gasification of pulverized coal. Another project relates to the flow of mixtures of pulverized coal and air, including metering. Studies of the drying of coal fines will be continued.

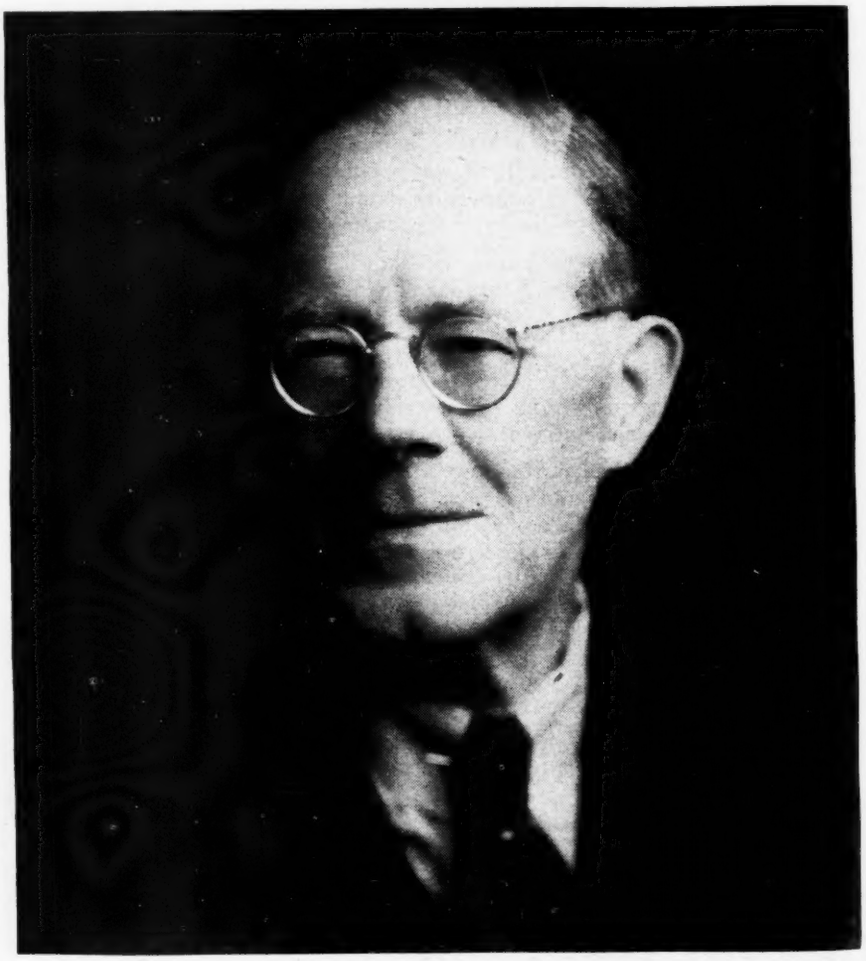
BCR will continue to be a major contributor to fundamental research at the Coal Research Laboratory at Carnegie Institute of Technology, Pittsburgh, and has special interest in the basic work on combustion and gasification reactions, heat transfer into coal during carbonization and combustion, coke and production of chemicals by hydrogenating coal.

R. Dawson Hall Retires After 35 Years on Coal Age

After more than 35 years on the *Coal Age* editorial staff, R. Dawson Hall retired as engineering editor Dec. 31, 1946. Mr. Hall was, in fact, one of the founders of *Coal Age*, having joined the staff July 14, 1911, while *Coal Age* was in the making. Some time earlier, James A. Hill, then head of the Hill Publishing Co., 500 Pearl St., New York, became interested in a new technical and business journal to serve the coal-mining industry. In 1911, he began forming a staff for the new publication, bringing in, among others, Mr. Hall, then a consulting engineer in Pennsylvania. The first issue of *Coal Age*, then a weekly, bore the date of Oct. 14, 1911, and included an article by Mr. Hall entitled "Georges Creek Coal Field, Maryland." The Hill Publishing Co. was merged with the McGraw Publishing Co., headed by James H. McGraw Sr., in 1917 to become the present McGraw-Hill Publishing Co., Inc., *Coal Age* becoming one of the larger group of technical and business journals which is still growing.

Born in England, Mr. Hall received his early education in private schools at Lancing, in Sussex County. He later attended University College School in London for four years, then matriculating at London University. Following this, he attended University College, winning the Junior Gilchrist scholarship and pointing his studies toward becoming a civil engineer.

Mr. Hall's conversion to mining engineering followed his coming to the United States in 1892, when he entered the employ of Alfred Herdman, Ridgway, Pa., who was then engineer for the Shawmut interests. On Mr. Herdman's resignation, Mr. Hall succeeded him as chief engineer for the company. He remained with the



R. Dawson Hall, retiring after more than 35 years of editorial work for *Coal Age*.

THIRTEEN TIMES THE LIFE AND STILL NO WEAR!

WITH "TOOL STEEL" PROCESS SPROCKETS

It's the tonnage that counts! And you can get your tonnage more profitably with "Tool Steel" sprockets.

Coal men everywhere attest to the fact that "Tool Steel" sprockets provide many, many times the service life of ordinary sprockets. The costs are comparable but your investment in "Tool Steel" means real profits.

We carry a complete line of "Tool Steel" sprockets for immediate delivery. Drop us a note today.

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and other TOOL STEEL HARDENED PRODUCTS

"Tool Steel" cut tooth sprocket, on a double rack drawing machine, has furnished 9 years of continuous service life without wear. In the same service, untreated steel sprockets were worn out within 8 months. Such records of superiority are commonplace with "Tool Steel".

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CINCINNATI 16, OHIO

Shawmut organization until 1901, acting as chief engineer and division superintendent, when he resigned and moved to DuBois, Pa., where he opened an office as consulting engineer. He continued in a constantly growing practice until 1911, when he joined the *Coal Age* staff.

Mr. Hall's interest in mining problems and in advancement of the industry's interests had resulted in the preparation of numerous articles for various technical papers during the time he acted as an independent engineer, so it was natural that he should take to editorial work. He was one of the early advocates of better working conditions, greater safety in mines and the use of machinery to increase efficiency and put the industry in position to meet competition, and his work in these and other directions was very largely responsible for the leadership of *Coal Age* in these fields. Roof and roof control became one of his specialties and his method of showing roof action by breaking a cigar across his knee became a classic in coal-mining history.

Mr. Hall's interests, however, were considerably broader than the coal industry alone and he has given largely of his time and energies to church, community and society affairs. His society and institute affiliations include the American Institute of Mining and Metallurgical Engineers, on whose Papers and Publications Committee he served for many years, the American Mining Congress, the National Safety Council, the Rocky Mountain Coal Mining Institute, which he had a significant part in organizing, Coal Mining Institute of America, Mine Inspectors' Institute of America, the Canadian Institute of Mining and Metallurgy and others.

In recognition of his services to the coal-mining industry, Mr. Hall was presented with the following scroll by the *Coal Age* staff:

"In Appreciation

"Of his outstanding contribution to the founding and development of *Coal Age*;

"Of his notable services in making *Coal Age* a potent medium for fostering coal-mining progress;

"And of his real contributions to better understanding and community and industry advancement;

"The undersigned members of the *Coal Age* staff, who have been privileged to work with him and know him as a friend, present this evidence of their profound respect and deep affection to:

R. Dawson Hall."

Although retiring from active work with *Coal Age*, Mr. Hall maintains his interest in coal and coal-mining affairs. His headquarters will continue at his home at 340 Burns St., Forest Hills, Long Island, N. Y.

New Washery Equipment, Methods Outlined at Illinois Society Session

A discussion of new machines and new practices in the construction of coal washeries by Harold C. Medley, preparation engineer for the Jeffrey Mfg. Co., highlighted the monthly meeting of the Illinois Society of Coal Preparation Engineers and Chemists at Benton, Ill., Nov. 22.

Beginning with driers, Mr. Medley analyzed factors in the design and application of bowl- and screen-type centrifugal units, screen-type thermal units and flash-type heat dryers. The trend, said Mr. Medley, is toward heat-drying the larger sizes and centrifuging the smaller with the flash dryer bringing heat to the problem of handling the latter.

The design of conveyors for carrying several sizes of coal in one conveyor is being explored. If one conveyor can be made to do several jobs it means a saving in space and mechanical parts. That scrapers with slots are weak and liable to distortion has been demonstrated. It also is difficult to keep the sizes from jumping into the wrong compartment at the feeding point. One newly designed conveyor, with moving partitions, has been in operation six months, two shifts a day. In it, the scrapers and partitions are the same height. It seems to be more satisfactory and to have a greater capacity than the fixed-partition-type conveyor. However, it does require more power and is more expensive to build.

Wet coal reduces the life of conveyor chains as much as 25 to 50 percent as compared with handling dry coal, Mr. Medley declared. To overcome this shortening of chain life, a heavy chain for the moving-partition-type conveyor has been built with ¼-in.-high welded-on wearing blocks that may be renewed. Replacing the wearing blocks in time adds considerable life to the chain.

Plans are under way to introduce pumping into the jig circuit to get around the short life of elevators used to handle the middlings. The middlings are screened out, crushed to liberate the coal, dropped into a sump where water is added and then are pumped back into the jig. Such a circuit, said Mr. Medley, will simplify the layout of the plant and make it easier on the layout man.

Screening out the fines from air-table refuse and using them in the jig as a heavy medium is now under experimentation. The third elevator's product is crushed and returned to the jig. The middlings are put over a double-deck screen and the portion passing over the top screen is sent to the crusher. Anything passing over the bottom screen is discarded but that passing through it goes to make the medium. Introducing heavy medium in the jig has improved its performance.

In discussing jig construction, Mr. Medley cited eight specific changes of recent date: (1) valves have been made larger; (2) manhole covers now are held by four screws in place of 60 bolts; (3) a shock absorber on the ejector rod now permits the motor to roll through and saves stalling the motor; (4) refuse elevators have shear pins to prevent breaking of the elevator chains and there also is a centrifugal plugging switch to stop the ejector motor in the event of failure of the shear pin, which avoids having to dig material out of the elevator boot before restarting; (5) elevator buckets are made heavier to resist both corrosion and erosion; (6) lay-bushed

Officers of the Society (now in its seventh year) from right to left: George Strunk, president; Thomas L. Garwood, first vice president; Lanning Dress, second vice president; and Carl Campbell, secretary.

Harold C. Medley (center), principal speaker at the meeting, Fred L. Kolb (left) and Harley A. Lee (right), representatives of the Jeffrey Mfg. Co.

chains are used with removable bushings and pins for the elimination of the effect of wear; (7) valves are mounted on cast-iron jig plates to facilitate the lining up of the valves during installation; and (8) replaceable wearing shoes have been added to the guide plates where the elevator chains ride.

Safety Topics Hold the Stage At Kentucky Institute Meeting

Safety was the keynote of every paper presented at the annual meeting of the Kentucky Mining Institute held at Harlan Dec. 7-8. Attendance was large and the membership now stands at 360. O. W. Evans, general superintendent of mines, Norfolk & Western Ry. fuel department, was elected president. George M. Humble, chief engineer, Stearns Coal & Lumber Co., and retiring president of the institute, was general chairman and Arthur Bradbury, safety director, Inland Steel Co., Wheelwright, served as assistant chairman of the meeting.

Mr. Evans presided at a dinner at which Daniel Boone Smith, commonwealth's attorney, Harlan, delivered an oration, "The Boy." Subjects treated in the papers included safety improvement, changes in mining and compensation laws of Kentucky, fires and explosions in Kentucky during 1946, permissible equipment and fire-resistant trailing cables. Louis W. Huber, district manager, Mine Safety Appliances Co., Lexington, was chairman of the committee which prepared the program for the two day meeting.

The Federal Mine Safety Code of July 24, 1946, which stemmed from the May 29, 1946 agreement between the coal mines administrator and the U.M.W., was explained by M. J. Ankeny, mining engineer, U. S. Bureau of Mines, Mt. Hope, W. Va. It places, he said, some of the responsibility for safety upon labor instead of leaving it entirely to management. In making up the code the director of mines was advised by two representatives of the mine operators and two of the U.M.W.A. Mr. Ankeny said that application of the code, which in a measure substitutes safety regulations by contract for safety regulation by law, is making a wide improvement in safety in mines.

The aim is maximum safety without jeopardizing production. Inspectors' duties are to see and report violations and not enforcement, the latter being left to the local mines administrator. It is mandatory, however, that management follow the recommendations of the local safety committee when danger is imminent. Provisions of the code supplement State statutes, with the more severe of the two applying. A reasonable length of time is allowed for making changes to meet the requirements.

No classification into gassy and non-gassy mines is recognized but a mine can be exempted from some items of the code if gas has never been detected on a flame safety lamp. In a mine where 0.25-percent explosive gas has been detected all new purchases of machinery must be permissible for all items for which permissibility has been certified; otherwise, explosion-tested equipment must be purchased.

Booster fans may be used under stringent requirements but are discouraged. Additional blower fans with tubing cannot be installed but old ones may be continued in use under stringent requirements. All main doors must be in pairs unless attended. Mr. Ankeny pointed out that one of the most forward changes is the requirement for fireboss examination of every mine before the first shift. In mines where gas has been detected there must be an examination at the beginning of every shift.

In discussion of the paper, S. H. Ash, director of the safety division, U. S. Bureau of Mines, expressed the opinion that mechanization, although it introduces some hazards, can be credited with a recent reduction in falls of roof fatalities measured on an exposure basis. He explained that the code is a serious and honest effort for cooperation and not coercion.

Walter Hornsby, inspector-at-large, Kentucky Department of Mines & Minerals, detailed the March, 1946, changes in State mining laws. A gaseous mine, if dusty, is still defined as one in which the percentage of explosive gas exceeds 0.50 percent at the return of any one split, but the gaseous non-dusty mine is now 0.75 percent instead of 0.25 percent as formerly. Inspectors were increased from 10 to 25, an electrical inspector added and the inspectors salaries raised from the range of $2,400 to $2,700 to a maximum of $4,200, expenses paid in both cases, he pointed out.

Instead of an indefinite "before each shift" firebosses must now examine gaseous mines three hours before each shift enters. Mr. Hornsby said a great improvement had resulted from a new requirement that the firebosses mine-record book "must show what has been done to correct such dangerous conditions." Many other less important changes were enumerated.

Important 1946 changes in the Kentucky compensation and occupational-hazard laws were listed and classified by S. C. Shaffer, casualty department representative, U. S. Coal & Coke Co., Lynch, Ky., as follows: (1) a subsequent injury fund was established to provide compensation for the cumulative effect of a second injury, primarily to further employment of disabled persons, including veterans; (2) compensation benefits were increased; (3) a straight $400 is now allowed for hospital and medical expenses without necessity for application to the board within the 90 days formerly required; and (4) carrying compensation was made compulsory instead of being optional with the employer.

Increases in compensation benefits were: from a maximum of $15 to a maximum of $18 per week for temporary total disability; from $4,800 to a maximum of $6,000 for death from accidental injury; from a total of $7,500 to $9,000 for maximum weekly payment of compensation for permanent total disability. Mr. Shaffer concluded that the recent amendments are reasonable and that all substantial employers have found it good business to subscribe to coverage by the act. He pointed out, however, that because of the compulsory provision the constitutionality is now being tested and the act may be declared unconstitutional, as was the 1914 act with that provision.

"Permissibility of Electrical Equipment," a paper by E. J. Gleim, electrical engineer, U. S. Bureau of Mines, Pittsburgh, in the absence of the author, was read by Mr. Ash and was followed by gas and coal-dust explosion demonstrations by Thomas R. Weichel, electrical engineer, U. S. Bureau of Mines, Mt. Hope, W. Va. Permissibility, the paper explained, takes into account the danger from shock and

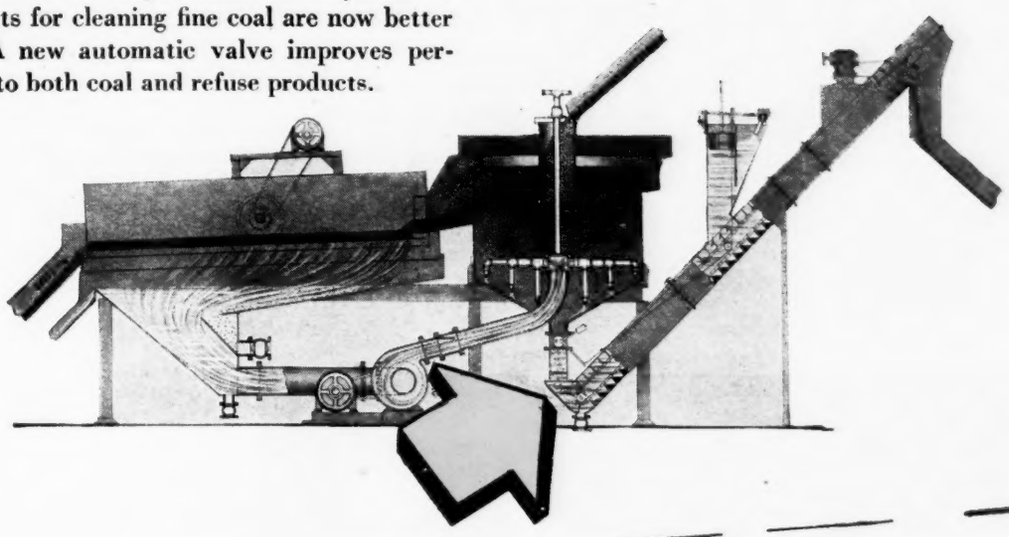
George M. Humble (left), retiring president, and O. W. Evans, president-elect.

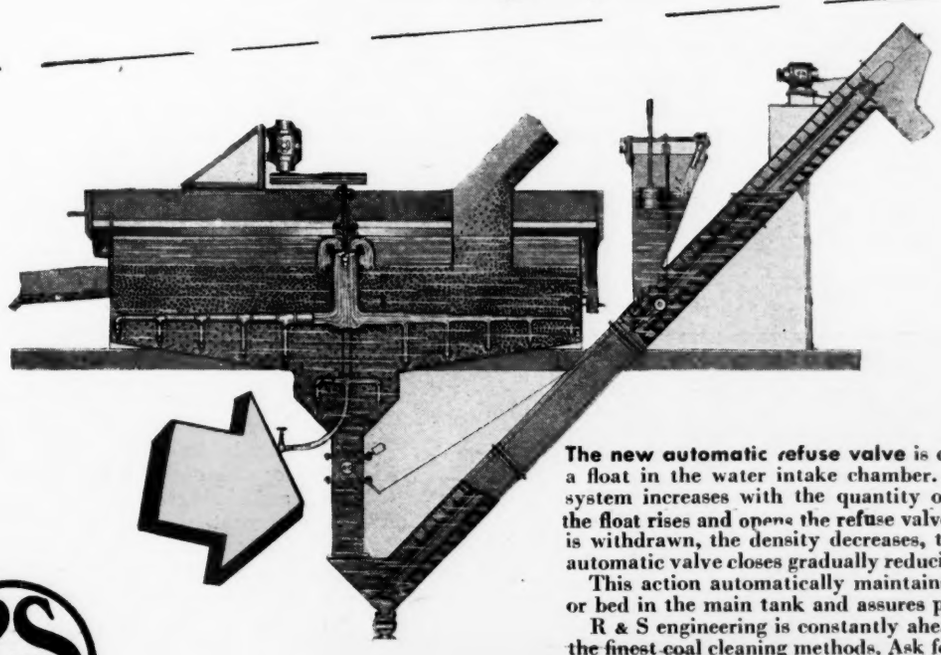
NEW ... Improved

R&S HYDROTATOR and CLASSIFIER UNIT

with automatic refuse valve

The popular R & S Hydrotator and Hydrotator Classifier units for cleaning fine coal are now better than ever. A new automatic valve improves performance as to both coal and refuse products.





The new automatic refuse valve is operated by cable from a float in the water intake chamber. As the density of the system increases with the quantity of refuse in suspension the float rises and opens the refuse valve. In turn, as the refuse is withdrawn, the density decreases, the float drops and the automatic valve closes gradually reducing the refuse discharge.

This action automatically maintains a constant "bottom" or bed in the main tank and assures peak performance.

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from fire by overheated cases, as well as the primary consideration of not passing on an explosion within the case to ignite explosive gas on the outside.

Hand-held drills and other hand-held items are not approved for voltages over 220 a.c. or 250 d.c. As a safeguard against setting fire to coal dust or other accumulations, the temperature of external surfaces such as rheostats must not exceed 200 deg. C.

The operators' responsibility for maintaining permissibility includes such steps as keeping bolts tight, holding entrance clearances around shafts and cables to a minimum, keeping earth grounding at low resistance, maintaining insulation in good condition, keeping internal and external parts clean and keeping fuses, overload relays and circuit breakers at settings of lowest possible values consistent with practical operation.

A need to train men to avoid placing additional loads on trailing and floor cables installed with a capacity planned for former loads was emphasized by Mr. Weichel in his paper, "Use and Maintenance of Fire-Resistant Trailing Cables." This type of cable, which he said will reduce mine fires and should be a "must," is now offered by about 13 manufacturers whose product has met the looped fire test of the Pennsylvania mines department. The loop (6 ft. of cable doubled to 3 ft.) is heated at five times rated current until a jacket temperature of 350 deg. F. is reached. Then a Bunsen burner flame is applied for 1 minute.

To be classed as flame resistant, the cable must have a jacket which will not propagate the flame for more than 14 in. during that minute. Although the usual cable construction is Buna-S for conductor insulation, the fire-resistant outer jacket is a compound of Neoprene which need not be inferior in wearing qualities to the former Neoprene jackets.

New K.M.I. Officers

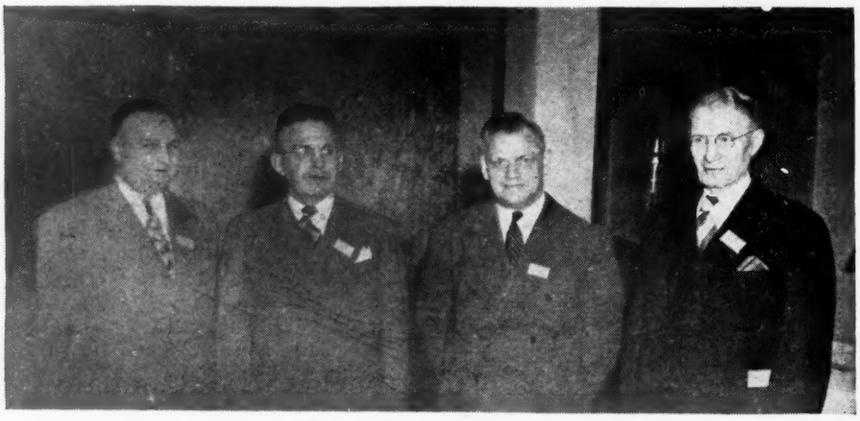
President, O. W. Evans, general superintendent of mines, Norfolk & Western Ry. Fuel Department.

First vice president, V. D. Picklesimer, general superintendent, South-East Coal Co.

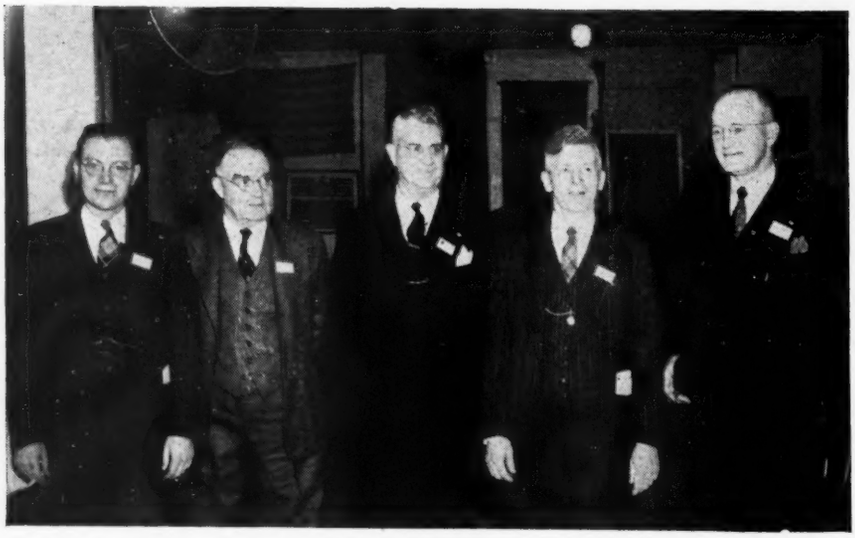
Second vice president, S. J. Dickinson, general manager, Mary-Helen Coal Corp.

Third vice president, C. B. Burchfield, general manager, Black Star Coal Corp.

Secretary-treasurer, A. D. Sisk, safety director, Big Sandy-Elkhorn Coal Operator's Association.



M. J. Ankeny (left), Walter Hornsby, S. C. Shaffer and George M. Humble.



Thomas R. Weichel (left), John E. Jones, S. H. Ash, Arthur Bradbury and A. D. Sisk.

Even fire-resistant cable requires care in installation and maintenance. Sizes must be adequate for service, splices must be strong and well insulated, cables with five temporary splices should be sent to the shop for repairs, working cables should be uncoiled off reels and cables in conveyor mining should be in short sections and/or stored in long loops. Discussion of splicing methods brought out the necessity of storing Neoprene tape in a refrigerator if it is to be kept over a month to six weeks. Otherwise it deteriorates and will not stick nor vulcanize. Proper use of good bonding cements with tapes is very important.

John E. Jones, safety engineer, Old Ben Coal Corp., West Frankfort, Ill., in his paper, "What Are We Doing to Improve Our Accident Record in Coal Mines," cited Kentucky and Illinois statistics that indicated that men stop learning too soon. Long experience in mines and mature years are not as important as might be expected. In Kentucky many of the roof accidents involve falls of thick rock—6 to 8 in. or more—which may not sound loose if hit only with a pick. Hitting the roof a sound blow with a sledge hammer was suggested by Mr. Jones. Management should learn proper roof sounding and see that it is applied properly.

The Old Ben Coal Corp., which operates several mines in Franklin County, Ill., pioneered both electric cap lamps and rock dusting. It was in 1915 that Mr. Jones, with that company, began selling those two safety measures. For Franklin County the fatalities from explosion, measured in periods in which 100,000,000 tons each were produced, have dropped consistently as follows: 1904-1922, 210; 1922-1928, 31; 1929-1939, 13; and 1940-1946, none.

Total accident rate per unit of exposure for the United States remains almost constant, and Mr. Jones cited frequency statistics from 40 industries showing coal mining to be the 39th, practically the foot of the class.

R. H. Thomas, chief, Kentucky Department of Mines and Minerals, in his paper, "Fires and Explosions in Kentucky During 1946," included a discussion of the lessons to be learned from the explosion of the drift mine of the Kentucky Straight Creek Coal Co. Small concentrations of carbon-monoxide indicate that fire is still present in that mine, which is sealed and contains 20 bodies.

New entries through unmined territory have been started but are being worked only by hand. If two cuts can be loaded for each of two shifts per day it would be possible to reach the back end of the mine, where the bodies are located, in about four months. The explosion occurred Dec. 26, 1945. Of the 31 men caught in it, eight were rescued from behind a barricade after 53 hours and six of those are living and apparently restored to good health.

During a shut down of 3½ days before the explosion the mine fan had been stopped. The mine was classed as non-gassy but it is the supposition that the ignition resulted from gas and the burning of coal dust followed. It was not violent and no mine cars on the main haulway were damaged but 22 fires were set in the 2½-mile distance from the origin to the portal. These were mostly in debris that

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The Cantrell Type S-P Compressor's broader service offers large savings in time and expensive equipment. Many coal mines use the "S-P" for ditch lining, leveling haulways, shifting pumps and mining machines, hauling repairs, riveting and blowing sub-stations.

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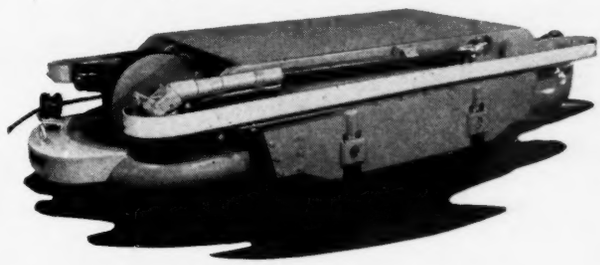
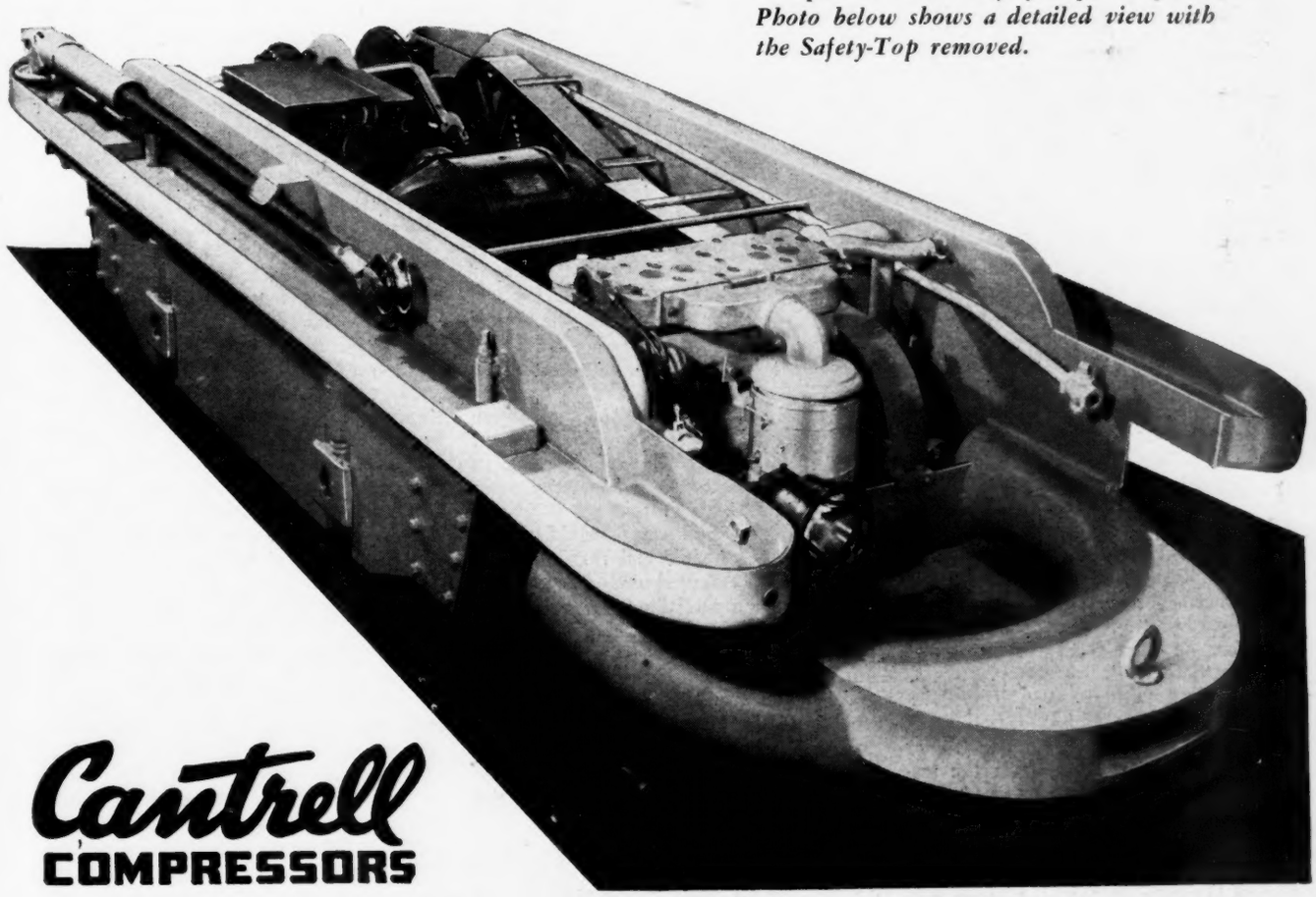


Shown above is the Cantrell Type S-P Compressor with Safety-Top in place. Photo below shows a detailed view with the Safety-Top removed.



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had been allowed to accumulate and the first fire was discovered 1,500 ft. inby the portal.

Among the lessons learned from the explosion were these: (1) absence of violence indicated that the explosion might have been stopped by even a light rock dusting, (2) men may be living after very long periods behind poor barricades; (3) it is thought that with self rescuers all nine of the barricaded men could have gotten to the outside; (4) fire-fighting equipment should be on hand at every mine; (5) an accurate and up-to-date map should be available quickly; (6) among the rescue crews there was a lack of men trained with oxygen-breathing apparatus; (7) good housekeeping is necessary and non-combustible stoppings should be used; (8) crosscuts should not be gobbed with rock; (9) it is important to detect very small quantities of gas; and (10) mines should be laid out without interconnections so sections can be readily sealed.

Coal Mining Institute of America Tackles Post-War Problems

C. A. McDowell, newly elected president of the Coal Mining Institute of America.

Research, as a means of retaining or extending markets, a forecast of the future of the coal industry, methods of working thin coal seams at a profit, high-school training for future miners and mining men and tests to determine the limiting charge of explosives in mines occupied the attention of the members of the Coal Mining Institute of America at its 60th annual meeting, Dec. 5-6, Pittsburgh, Pa.

The U. S. Bureau of Mines, declared the committee on explosives, is continuing its study of the charge limit but has been already sufficiently impressed with the results of the experiments in the experimental mine that it has extended its approval of the charge of 3 lb. of permissible explosive to Dec. 1, 1947. The committee on flame-resistant cables reported that the U. S. Bureau of Mines had not arrived at any conclusion on this matter.

The coal industry is at one of the most critical periods in its history and perhaps, because of the pressure of competitive fuels, said H. F. Hebley, director of research, Pittsburgh Coal Co., the industry will have to show the consumer how to use this fuel with due economy, or it will find that competitive fuels will displace coal. Smoke also has become such a nuisance that 55 cities are contemplating restrictions on the use of coal, or have already restricted such use.

Higher wages affect the price of competitive fuels less than coal, because such a large percentage, perhaps 70 percent, of coal production is chargeable to labor. Storage of liquid fuel also is easy, and both gas and oil can be stored for peak demand; gas can be pumped back into boreholes where space is available after the original gas and oil have been exhausted. Oil and gas do not suffer like coal from degradation in handling, nor do they deteriorate in storage from degradation and weathering.

Coal-mining methods have changed little. The industry still uses variations of the room-and-pillar system, longwall or stripping, where conditions favor the several methods. Extraction losses due to sloppy methods, the poor quality of the raw product, the waste of coal in refuse banks and excessive power costs, all burden the coal operator. Moreover, only 60 percent of the coal in the ground is recovered.

In Russia, coal is being gasified underground but so far with low efficiencies and an uncertain product. Perhaps, it may be possible to develop this system and make it efficient and reliable, and perhaps, by studying rock stresses on advance and on retreat or during pillar extraction, recovery may be bettered and the coal may be obtained at less cost.

Consumer savings can be made by utilization of the gas turbine as modified and applied to the burning of pulverized coal. Such gas turbines have been used effectively in Switzerland, but only with oil fuel. Saving can be effected by group heating of houses using a central steam-generating plant and piping the steam by mains to the several dwellings. Heating through pipes incorporated in the floors of rooms, also advocated, has given excellent results. Electrification of railroads, using central stations is an economy that might preserve coal's place in railroading, by using that fuel to generate electricity but, unfortunately in only a few regions does the density of population justify such a change from present practice.

A so-called "Quiz-O-Gram" in which selected questions from the members were submitted to six specialists best equipped to answer them then followed. This will appear in the Foremen's Forum section of a future issue.

In his banquet address, Paul Weir, consulting engineer, Chicago, declared that an analysis of what happened to the bituminous coal industry during World War I and the years which followed may help us to anticipate what may and may not occur during the next few years.

In 1944, the mines were working on a 6-day weekly schedule and running at 99 percent of the indicated productive capacity with almost no car failure and small local strikes. The five-day week, when conditions approach normality, will go far to bring production and demand into balance, and in 1946 would have provided coal for stocks and the increase in exports. What coal will be needed hereafter, after stock piles are filled and exports are satisfied is not clear. More can be produced than the market demands.

Twenty-five years ago, the investment in a then modern mine of substantial size was about $1.50 per ton of annual capacity, not including housing and coal lands, whereas the outlay today, in a comparable mine, but equipped with mechanical loading devices and mechanical cleaning facilities, approximates $3.50 to $4 per ton of annual capacity. Thus, the cost is more than two and one-half times that of 25 years ago.

The investment per employee in such a mine, if underground, (plant, equipment and development only) ranges from $7,500 to $10,000. Only a strategic location or a coal of superlative quality can keep a mine without the most modern equipment in a competitive position. The cost of getting into the coal industry as an operator is high. This in itself operates against any inflation of productive capacity.

Higher wages in an industry stimulate interest in labor-saving devices. On the basis of the Krug-Lewis agreement of May, 1946, and a weekly schedule of five operating days, mine wages are on the average about two and one-half times those paid in 1934. Those small automatic devices which replace a man here and a man there now become more attractive. If an investment of $1,500 in any such a device to save one man could be justified in 1934, on the same basis an investment of $3,750 can be justified today.

In concluding, Mr. Weir declared that many miners will look elsewhere than to the mines for a job. Their status as miners must be raised or they will leave. High wages will not hold them. Mining has little representation in Congress. None of the Senators are mining men and only two members of the House of Representatives. No wonder the industry is "pushed around." It is certain, we shall have deflation both in mines and in miners as time advances.

Outlining several of the most efficient types of thin-coal mechanical-mining methods and the equipment used in connection therewith, J. J. Snure, assistant production manager, Rochester & Pittsburgh Coal Co., described the following.

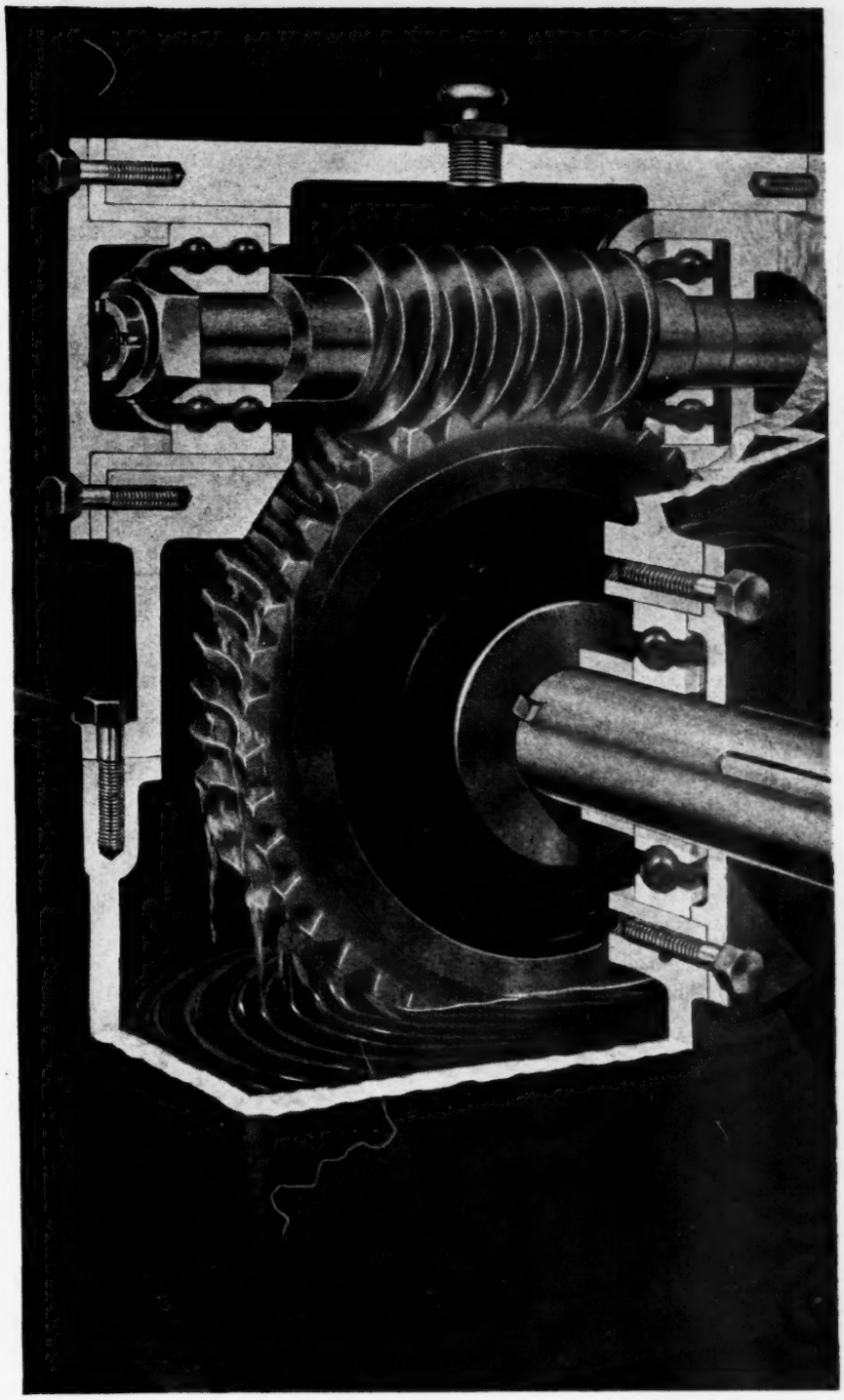
1. *Cutter-Loader System with Chain Conveyors*—The Shortwaloader, a single piece of equipment (Fig. 1), both cuts and loads. This concentration of function in one unit is sound, and many production men feel a machine of this type, under appropriate conditions, will some day be used in thin seams with increased economy.

Inside Knowledge on Lubrication Problems

—HEAT—

This is One of a Series of Messages on Common Problems in Your Mine

Worm on a Hot Spot



WHEN the worm turns inside gear-sets like this, it creates heat. In fact, this is one of the hot spots in your coal mine.

This means that it's a tough spot to lubricate. For the oil not only has to stand up under high temperatures, but it also must resist rupture under the high pressures that cause the heat. The same oil also must protect the highly polished surfaces of the many ball bearings throughout the set.

You'll find the answer in Gargoyle Cylinder Oil 600 W. Specially designed for this kind of service, this superior Socony-Vacuum product provides both high chemical stability and exceptional film strength.

Let your Socony-Vacuum Representative make a lubrication survey of your mine, and give you the correct recommendation for every machine you operate.

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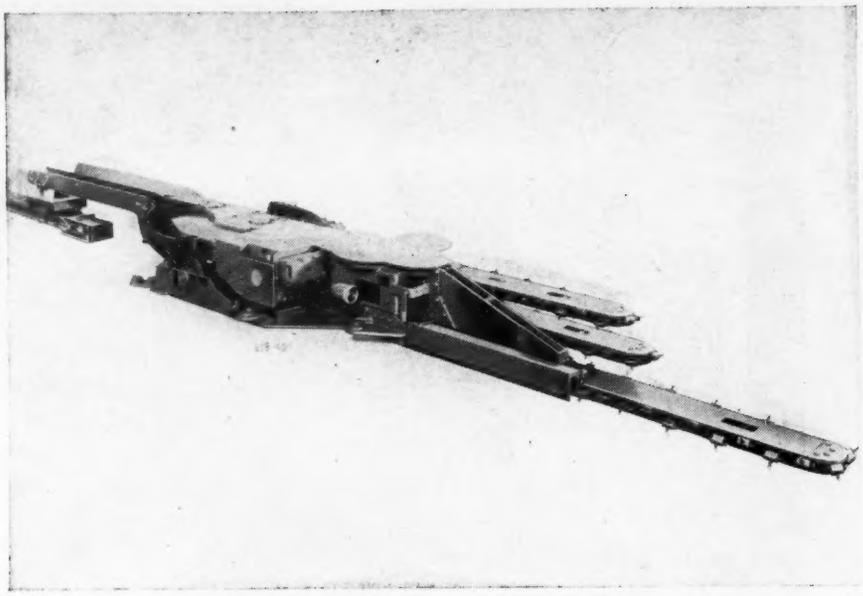

Fig. 1—Combination machine cuts and loads in one operation

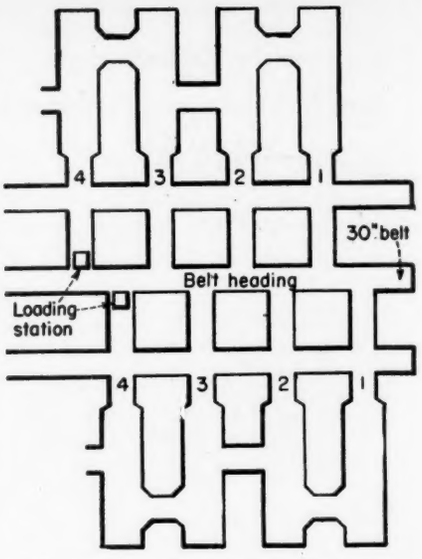

Fig. 2—Layout for thin-seam mining

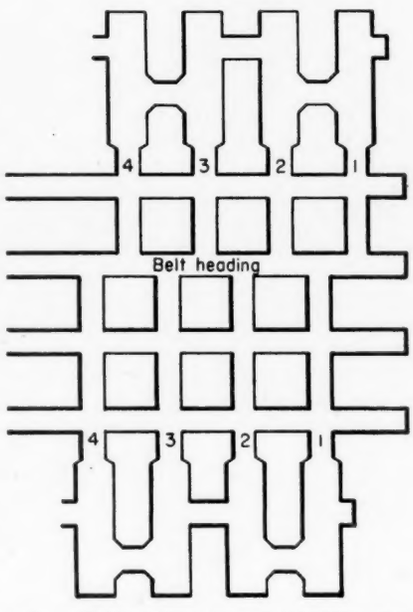

Fig. 3—Alternate plan for thin-seam mining, mine "A"

This machine has several outstanding features:

(a) Moving and maintenance are of one machine only, whereas, in any other types of mining equipment, both the cutting and loading machines have to be moved and maintained.

(b) The tendency today in thin-coal mines is to use fewer working places and smaller crews, with more tons produced per man; and, as a cutter-loader stays permanently in one place, it is adaptable to this principle. The assumption is that we should get enough added efficiency to offset any increase in capital investment caused by lower production per machine. The cutter-loader discharges on high-capacity chain conveyors, which discharge on a 30-in. butt belt running about 325 ft. per minute.

Three of these machines developing a three-heading butt entry, working two shifts, have driven 1,100 ft. in a calendar month. Three men were used on each cutter-loader—two supplymen and a boom man. Each of these units averaged five to six cuts per shift. As far as speed is concerned in developing thin seams, this machine has no competitor. Under suitable conditions, the cutter-loader can cut and load five wide places each shift with a four-man face crew, or about 32 tons per face man.

2. *Duckbills and Shaker Conveyors*—Self-loading shaker conveyors discharging on belts, also are being used successfully. This equipment stands up well under the average mine use and has a minimum of outages and generally very low maintenance. The same mining system is used as previously described. In development, a shaker conveyor can be used to drive each of three butt headings, discharging onto a butt belt. Eight men at the face produce about 150 tons per day. The entry is brought back with six shakers and three rooms on each side of the entries. Four-man crews are used in the production rooms which are driven 30 ft. wide. These six shaker conveyors produce about 420 tons per shift. In higher seams, with more favorable conditions, duckbills which move across the face under their own power are producing 30 to 40 tons per face man.

3. *Crawler Loaders and a 30-in. Belt*—Low-type crawler-mounted loaders dumping on high-capacity chain conveyors have been adapted to mines with a bed thickness of from 38 to 44 in., and are doing a very satisfactory job. A developing entry, with three or four headings, is driven up with the following equipment: one 30-in. belt, one loader, one mining machine, one mining-machine truck, one portable coal drill and five conveyors. A 7½-man crew is used consisting of five facemen, one boom man, one mechanic and half a supplyman. This set-up will produce about 120 tons per shift, or 16 tons per crew-man.

When the entry is driven its full distance, three loading units are used to pull it back, one on one side and two on the other. Each loading unit consists of one loading machine, one mining machine, one machine truck, one portable coal drill and two conveyors. These crews include five facemen, one operative, one helper, one cutter, one scraper and one preparation man. In full, there are 19 men in this section—three operatives, three helpers, three cutters, three scrapers, three preparation men, one mechanic, one belt cleaner, one supplyman and one boom man. These crews will cut and load 15 to 18 places per shift, or about 400 tons, or 27 tons per face-man, or 21 tons per crew-man.

Recently, the manufacturer ut the height on the higher-capacity loaders, and an experiment was made in the same mine with this machine loading on conveyors. This machine had a much higher operating speed and was capable of loading out about 33 percent more places than the smaller machine. To accomplish this, it was necessary to add the sixth faceman. The production per man at the face was 33 tons in comparison with 27 tons with the smaller machine.

4. *Higher-Capacity Cutter-Loader With Shuttle Cars and Belt*—In another mine, called "A", for identification purposes, the higher-capacity machines loading into 3-ton battery-powered shuttle cars are performing satisfactorily. Three developing entries are driven up 2,200 ft. with a loading machine, one cutting machine with a 9-ft. bar, one coal drill, one caterpillar truck, and two shuttle cars discharging on a 30-in. belt. A ten-man crew consisting of one operative, one helper, one cutter, one scraper, two drivers, one mechanic, one supplyman and one belt cleaner, one shotfirer and one boom man will produce from 200 to 250 tons of material, or 22½ tons per man per shift.

When this section starts retreating, two loading units are used, one on either side of the belt, working in four or five rooms. This double crew of 24 men produces about 770 tons of material or 32 tons per man. Studies and experiments in this system have been made, and it was found that when the rooms had been developed beyond the first crosscut, addition of a third car increased production about 12½ percent. The only additional labor necessary to produce this extra tonnage was the driver of this additional shuttle car.

Recently an improvement was added to

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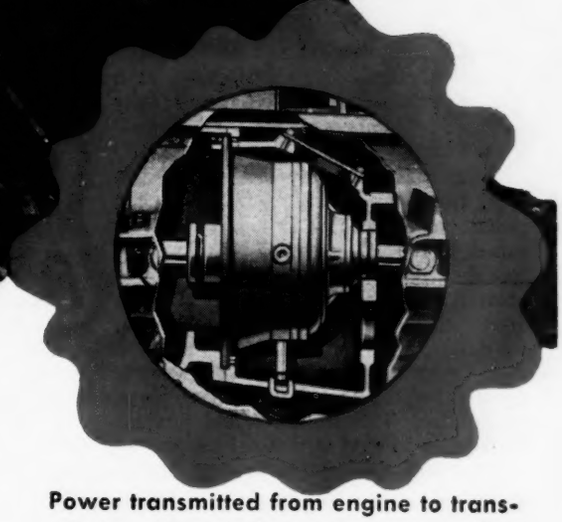

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the cleaning plant permitting all the bone coal overlaying the seam to be loaded and sent outside. This increased the output of the facemen about two tons per man. Picking out the larger pieces of bone at the face had involved additional labor and slowed down loading time.

The industry is ready to admit that outages are inevitable, and some means must be found to offset them. This new trend has led to a material reduction in the size of the face crews. A suggested plan for Mine "A" follows: Develop a four-heading butt entry with two loading machines, two cutting machines, two coal drills, and two cable-reel elevating-discharge shuttle cars.

A crew of five production men at the face would work the left-hand pair of headings and a similar crew would work the right-hand pair. The two crews would consist of two operatives, two helpers, two cutters, two scrapers, two drivers, one mechanic and one boom man. This set-up would require twice as much equipment, but would increase the development speed about 50 percent.

In case of mechanical outages, the two small crews could be combined, and the loss minimized. This crew should clean up eleven to twelve cuts per shift, or 22 to 26 tons of material per man. This is only a slight increase in daily production. However, the improvement will come in sustaining a better average production. It is generally realized that today, in fully mechanized mines, outages cause extreme fluctuations.

When this entry starts back on production, two crew set-ups, working in two rooms each, are to be installed on either side of the belt. This section will then have four loading machines, four cutting machines, four coal drills, and five buggies (one extra), worked by a crew of 23 men, comprising four operatives, four helpers, four cutters, four scrapers, four drivers, one mechanic, one belt cleaner, and one boom man. This section would produce 22 cuts, or 35 tons of material per man—a substantial increase in man-tons—and would have moreover a better average production.

In this system, if there is a machine outage, a maximum of five men are idle and, even then, on the present plan, these men could be combined with the five men in the adjacent set-up and worked as a ten-man crew. Any loss from mechanical outages would thus be cut to a minimum. This type of set-up would have more efficient supervision, because only five men are at the face of the two rooms. The work of these men would be quite apparent and, if the supervisor has to leave the crew, on his return, he can readily visualize what has been done in his absence. It is thought that a foreman can supervise two or more small sections under this system more readily than one large section.

In this suggested plan, cable-reel cars with elevating discharge have been substituted for battery-powered cars. The cable-reel cars would deliver directly onto the belt at the mouth of each room, thus eliminating about 25 percent of the hauling distance and practically all turns. Charging stations which are an important ventilating problem need not be provided and cars will not have to be taken to the charging stations at the end of each shift. On each set-up from one-half to one manshift will be saved in mechanical-service labor.

Further improvement has been made in this new set-up by substituting a hydraulically-operated shortwall cutting machine with a bug duster attached. This machine eliminates practically all of the handling of cuttings and gives the scraper time to drill or timber, while the cutter is operating the machine. Because of the hydraulic feature, this machine should have fewer maintenance outages. The saving on preparation should just about equal the saving made in the haulage by the adoption of cable-reel cars.

In November, 1940, the Pennsalt Coal Co., a subsidiary of the Pennsylvania Salt Mfg. Co., said W. S. Malcolm, superintendent, put in operation a combined cutting and loading machine (Jeffrey 43-L Shortwaloader) at Natrona No. 1 mine in the Upper Freeport bed at Natrona, Pa. At this mine, this bed varies little in thickness, averaging 54 in. between top slate and bottom fireclay.

This unit is a modification of the shortwall cutting machine. It is equipped with three cutting and loading bars, one of which undercuts the face while the other two gather the previous fall of coal into two endless flight conveyors which transfer it to a room conveyor. The machine discharges the coal by a rear boom which, at its forward end, is pivoted to the body of the machine and, at the rear end, to a room conveyor through a movable connection. Room conveyors are chain-flight conveyors 18 in. wide. They deliver to an elevating conveyor which discharges the coal into cars on the track.

In starting a new working place, the first procedure is to undercut the face. This is done by sumping the cutter bar to a depth of 4½ ft. and cutting across the face, right to left. A driller follows using a post-mounted electric drill. Usually all but two holes at the left of the place have been drilled by the time the machine has completed the undercut. While the machine crew is returning the machine across the face and changing bits, the two holes on the left are drilled. Before the holes are shot, the cutter-loader is moved to a new sumping position. After the coal above the cut has been broken down, the machine is sumped in the face. It is at this point that the middle and upper bars come into service, and the first fall of coal is loaded by them while the second cut is being made.

The face crew is made up of machine operative, scraper, driller and helper. As the machine loads out enough coal at the right of the face, the scraper enters behind it, trims the rib and the face, and cleans up after the machine. The driller and helper then drill the shotholes as previously described.

Five full cycles are averaged per shift, which is 25 tons plus per man at a working face 16 to 25 ft. wide. The averages taken are from several six-month periods in the past five years. Experience with this equipment has more than met expectations in production and maintenance costs. In reply to questions, Mr. Malcolm said that rooms could be driven 35 ft. wide with the equipment.

Coal operators can afford to spend more on equipment now that interest rates are low, asserted L. E. Young, consulting engineer, Pittsburgh, Pa. Cheaper money makes it easier to finance the acquirement of spares and thus avoid outages, especially as such dislocations in operation have become more costly with increases in wages, for outages cost more than both depreciation and interest.

In recent years the attention of both the educational world and the mining industry has been focused on a supposedly new type of training program—the vocational mining course for day-school students in high schools, said D. C. Jones, supervisor, Mine Extension, Pennsylvania State College, in an article read by D. C. Hunt, assistant. The term "supposedly new" is used intentionally, for work of a similar nature was undertaken for many years at the Freeland Mining and Mechanical Institute, Luzerne County, Pennsylvania, and this was the outgrowth of a training program started near by at Drifton in 1879. The establishment of mining courses in our public school systems on a secondary level is of comparatively recent origin. Such study is imperative for the mining industry, as the burden of establishing the courses and maintaining interest in them, so far, has been carried largely by our public-school officials. To prosper and have value for the industry this work must be given support and guidance of the industry.

Most coal mines are located in rural areas and graduates of high schools located in these areas will naturally gravitate toward the chief local industry—the coal mine, though some will leave the area to seek employment elsewhere. However, many of these graduates will be miners' sons, and these young men should make the best type of miner. Providing training in mining fundamentals in high school will give the graduate a good start before he enters the industry, shortening the time it would

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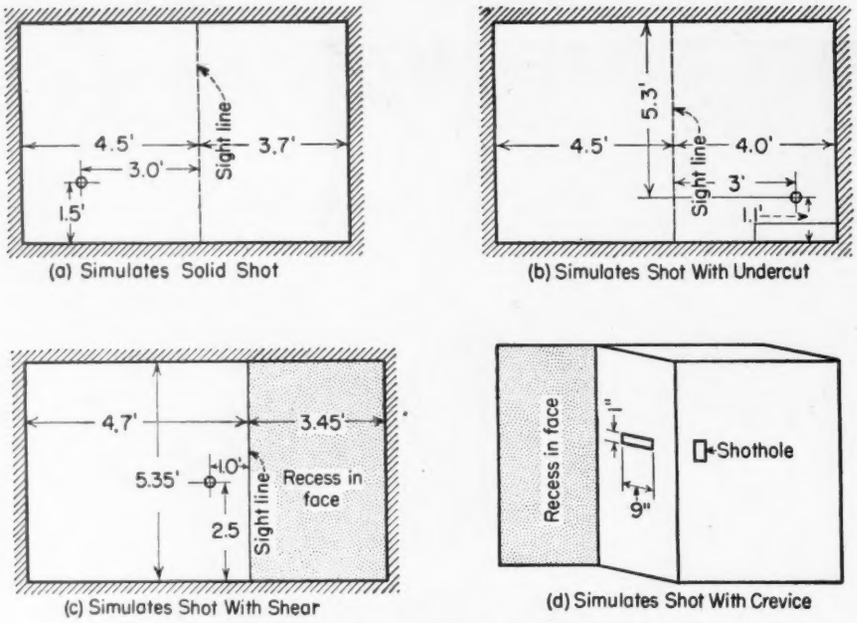

Fig. 4—Diagrams of face in shooting tests of experimental mine.

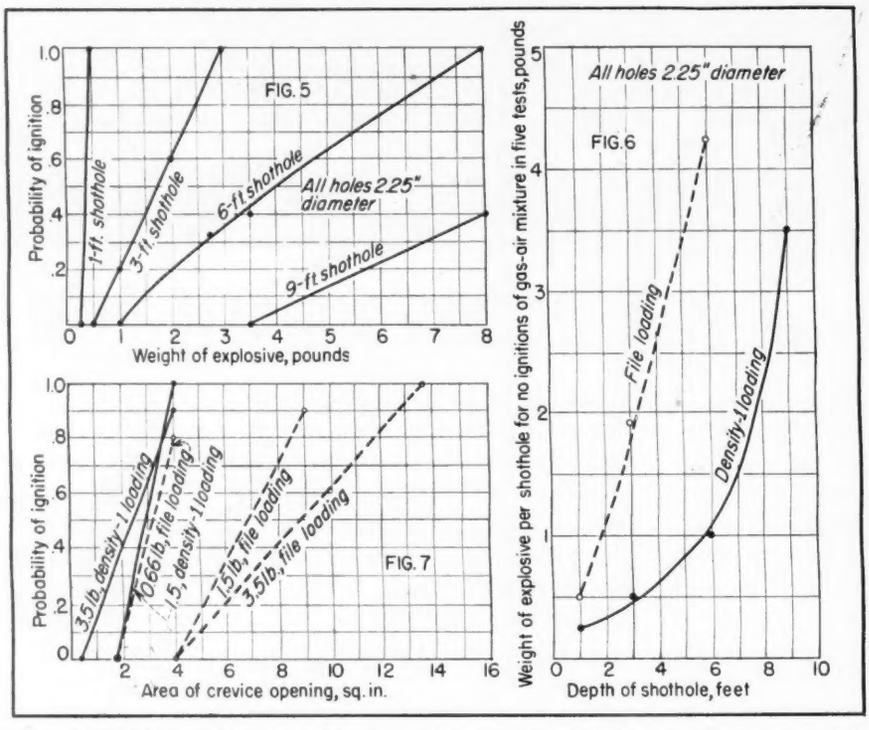

Fig. 5—Results of blowout shot tests with varying weights of explosive, loaded unstemmed at density-1, in holes of varying depth; Fig. 6—Relation of depth of unstemmed shotholes to the limiting charge of permissible explosives that will prevent ignition of firedamp when a shot blows out; Fig. 7—Probabilities of firedamp ignition through a side crevice with various weights of explosive and various crevice areas.

otherwise take to make him an efficient miner. Such training will also encourage those graduates to consider mining as a lifetime profession and will keep such young men from drifting away from the areas where they have attended school.

In discussion of Mr. Jones' paper, Mr. Riffle, Mapleton, Greene Co., Pa., declared that the State was seeking to establish types of training that could be introduced with least expense. Practical mine training needs expensive machinery and competent instructors. The industry will not succeed so long as it "takes whatever comes along." However, the students of mining should find civics and mathematics in their curriculum.

Shopping around for the cheapest kind of education will not produce men who can effectively perform the tasks that mining involves, declared M. D. Cooper, manager, vocational training, National Coal Association. One doesn't buy the cheapest kind of machine for mine service but the best; why then should we select only the cheapest kinds of education?

It is difficult to keep mining instructors on the job, said W. J. Schuster, safety director, Hanna Coal Co. They find that even the miners are getting $50 a week, and they want to enter the industry and get more money than teaching affords. Schools for miners help the present mining force, for the boys in training carry home to their fathers what they learn in the school and so educate them. Mathematics and report-making should be part of the curriculum.

The boys, declared J. J. Rutledge, chief mine engineer, State of Maryland, don't want to go to mining schools, for the girls with whom they have been associating all go to the other forms of advanced training in the grammar schools. The boys are "girl hungry." Manual training does not prepare boys for the mines. In the manual-training school they learn how to make toys, and not how to put a handle in a pick or how to set and sharpen a saw.

Sons of miners do not seek training as miners, declared L. S. Marshall, supervising principal, Springdale, Pa. A social stigma seems to rest on the industry. When miners are getting $300 a month, the teachers get $1,200 a year, and it is difficult to get instructors in mine work or pay salaries that would attract them. It is just as essential to train mining men as to educate lawyers and doctors. Good citizenship, however, should always be included in the training.

Tests made by the U. S. Bureau of Mines with gelatin explosives to determine whether the charge in shotholes can be safely increased from 1.5 to 3 lb. per shot were described by H. P. Greenwald, superintendent, Central Experiment Station, U. S. Bureau of Mines, for himself and I. Hartmann, supervising engineer, Experimental Coal-Mine and Dust-Explosions Section, of that bureau.

Holes were loaded in two ways: (1) "Density-1 loading", in which the cartridges were split and pushed to the rear of the hole, where pressure of the tamping bar expanded them until they entirely filled the cross-section. (2) "File loading" in which the cartridges were pressed firmly into contact, but were not purposely expanded or otherwise deformed.

A single No. 6 detonator was used for each shot. This was placed in the first cartridge that was pushed in the hole. Shots were stemmed with fireclay in paper tamping bags.

Probability of ignition in the tests here considered is reported as the decimal resulting from the number of ignitions obtained, divided by the total number of shots made, in a given group of tests. Thus if, under a given set of conditions, two ignitions were obtained in five trials, the probability is noted as 0.4. When there are no ignitions in five trials, the probability is recorded as 0.0 and, when ignition is obtained in all trials, the probability is noted as 1.0.

Twenty tests were made with stemmed shots loaded with "density-1" and five tests with "file loading." In five tests the depth of the hole was 3 ft.; in all others it was 6 ft. In ten tests, 3 lb. of explosive was used and 8 lb. in 15 tests. The

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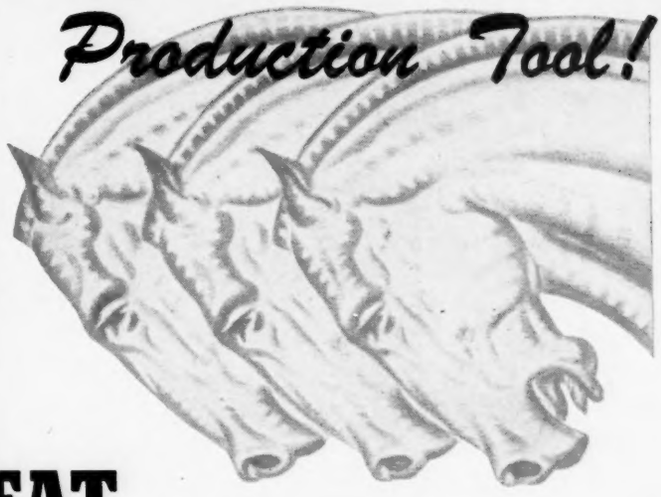

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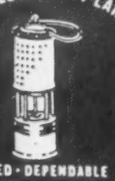

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EQUIPMENT APPROVALS

Four approvals of permissible equipment were issued by the U. S. Bureau of Mines in November, as follows:

Westinghouse Electric Corp.—Westinghouse-Whitcomb 60MM, 9 metric-ton storage-battery locomotive; Approval 1536; Nov. 1.

Goodman Mfg. Co.—Type 477 power duckbill loader; 3-hp. motor; 230 and 500 volts, d.c.; Approvals 565 and 565A, respectively; Nov. 19.

Joy Mfg. Co.—Types 14BU-7AE/AF and -7BE/BF loaders, respectively; each equipped with four 7½-hp. and one 4-hp. motors; 250 or 500 volts, d.c.; Approvals 566 and 566A; Nov. 26.

Jeffrey Mfg. Co.—Type 61 conveyor power unit; 7½-hp. motor; 250 volts, d.c.; Approval 567; Nov. 29.

crucial tests were made with 8-lb. charges loaded at "density-1," in 6-ft. boreholes with 24, 12, 9, 6 and 3 in. of stemming respectively, in successive groups of five tests. In no case, did a stemmed shot ignite gas. Comparing these results with those of unstemmed shots, the imperative importance of stemming shots heavily and with care is demonstrated. A large factor of safety can be obtained with little extra effort, and that effort should be expended on every shot.

As no ignitions were obtained with stemmed shots, it was impossible to use them in a study of the effects, on gas ignition, of shotholes depth and many other factors. For complete information, some of the crucial tests must fall in the zone where both ignitions and nonignitions are obtained; otherwise one does not know how close to danger are the governing conditions. Hence, a large number of tests were made with unstemmed shots to evaluate various hazards.

Fig. 5 shows results obtained with shotholes of 2.25 in. diameter and ranging in depth from 1 to 9 ft. The explosive was charged at "density-1," unstemmed, and in quantities ranging from 0.25 to 8 lb. Note that the maximum weight for zero probability increases from 0.25 lb. for a 1-ft. hole to 3.5 lb. for a 9-ft. hole. Note also the wide range in which both ignitions and nonignitions occur. With a 6-ft. hole, the weight of explosive had to be increased to 8 lb. to give five consecutive ignitions of the gas, whereas to give five consecutive nonignitions not more than 1 lb. could be used.

"File loading" is safer than loading at "density-1." This is shown in Fig. 6; here the curves are for zero probability (no-ignition loading) with quantity of explosive related to shothole depth. The curve for "density-1" is constructed from the data for zero probability that appear in Fig. 5. Note that, in a 6-ft. shothole, only 1 lb. could be used with loading at

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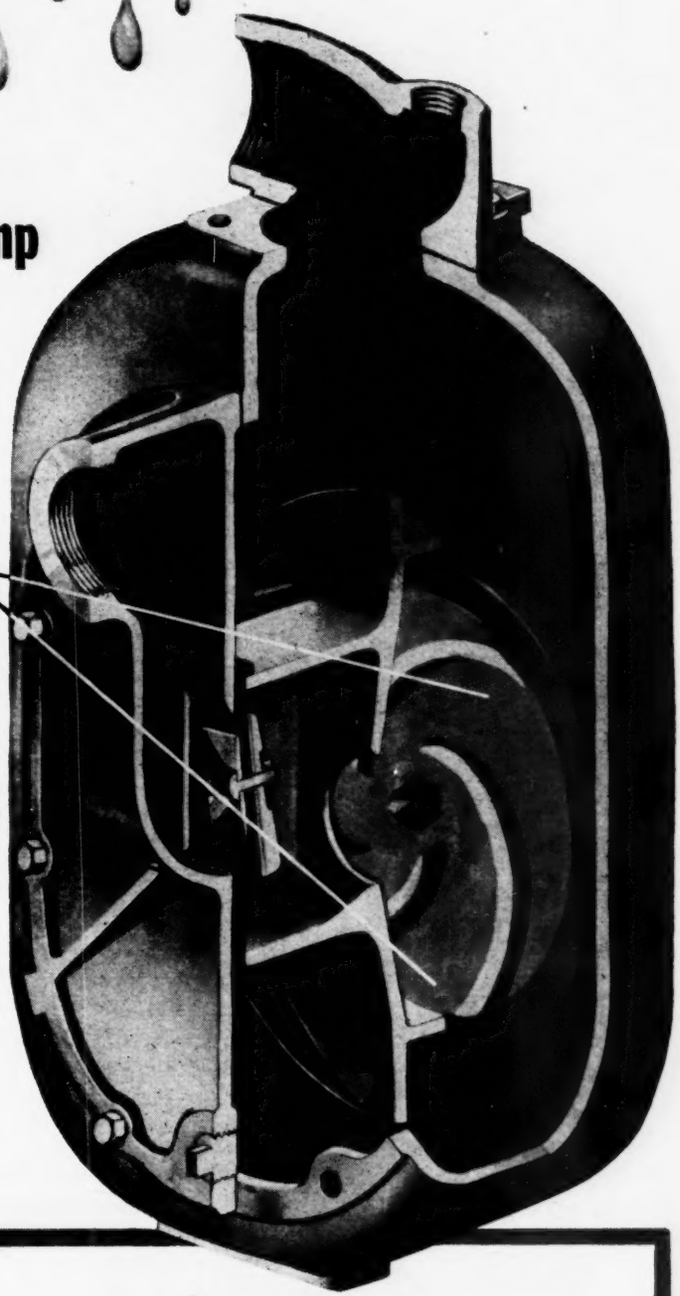

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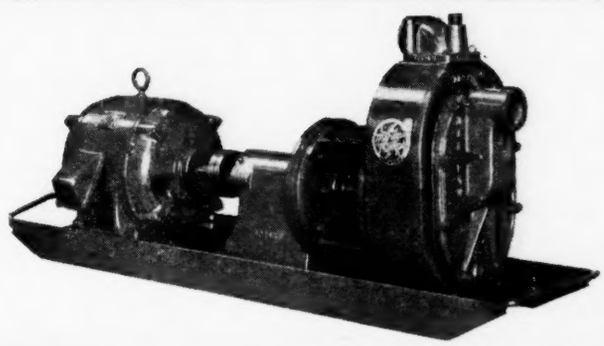

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density-1," whereas, with file loading, nearly 4.5 lb. could be used. Other tests showed that there are complicated relations between diameter of cartridge and diameter of shothole that affect safety, but these are less important than the difference between "file loading" and "density-1" loading, shown by Fig. 6.

In the early work, it was thought that presence or absence of gas in the shothole where it would be in direct contact with the explosive, might be an important factor in determining ignition. Test methods were devised under which the gas was either absent from the shothole or present in full volume as desired. Some difference in results were observed, but they were small and wholly insignificant in comparison with the effect of a change in quantity of explosive used.

The effect of sheathing an explosive with incombustible material was investigated by two groups of unstemmed blow-out shots in shotholes 3 ft. deep. The cartridges of explosive were 1.5 in. in diameter before sheathing, and 1.37 lb. was the maximum quantity of unsheathed explosive that gave five consecutive non-ignitions. When sheathed, the quantity was increased to 3.02 lb., which filled the shothole to the collar, and no ignitions were obtained. Sheathing increases safety markedly insofar as blow-out shots are concerned, but is less helpful in creviced shots, as will be shown.

Duplicate tests were made with holes bored against the face and butt cleats of the coal, and no difference in results was found.

The blow-through tests were made in well-stemmed 2.25-in. diameter shotholes. The weight of explosive charge ranged from 3 to 8 lb. per shot; both "file loading" and "density-1" loading were used. Tests were made with blow-through shots both to undercuts and to shear cuts, with coal burdens between shotholes and cut ranging from 3 to 12 in.

Eighty-three tests were made, and only one ignition of the gas was obtained. This was with 3 lb. of explosive, loading at "density-1 in a 3-ft shothole which blew through a 6-in. burden into an undercut. Later, ten tests were made in which 3.5-lb. charges blew through 3-in. burdens to undercuts and shears without an ignition. The single ignition is an oddity in the results and illustrates the uncertainty, ever present in ignition phenomena.

In conclusion, Mr. Greenwald detailed what had been done to test the hazards where shotholes are creviced. These had not been considered in setting the charge limit, because such crevices had not so far been detected in American mines. Any conclusions he said made at this time may have to be amended when additional tests have been made.

•

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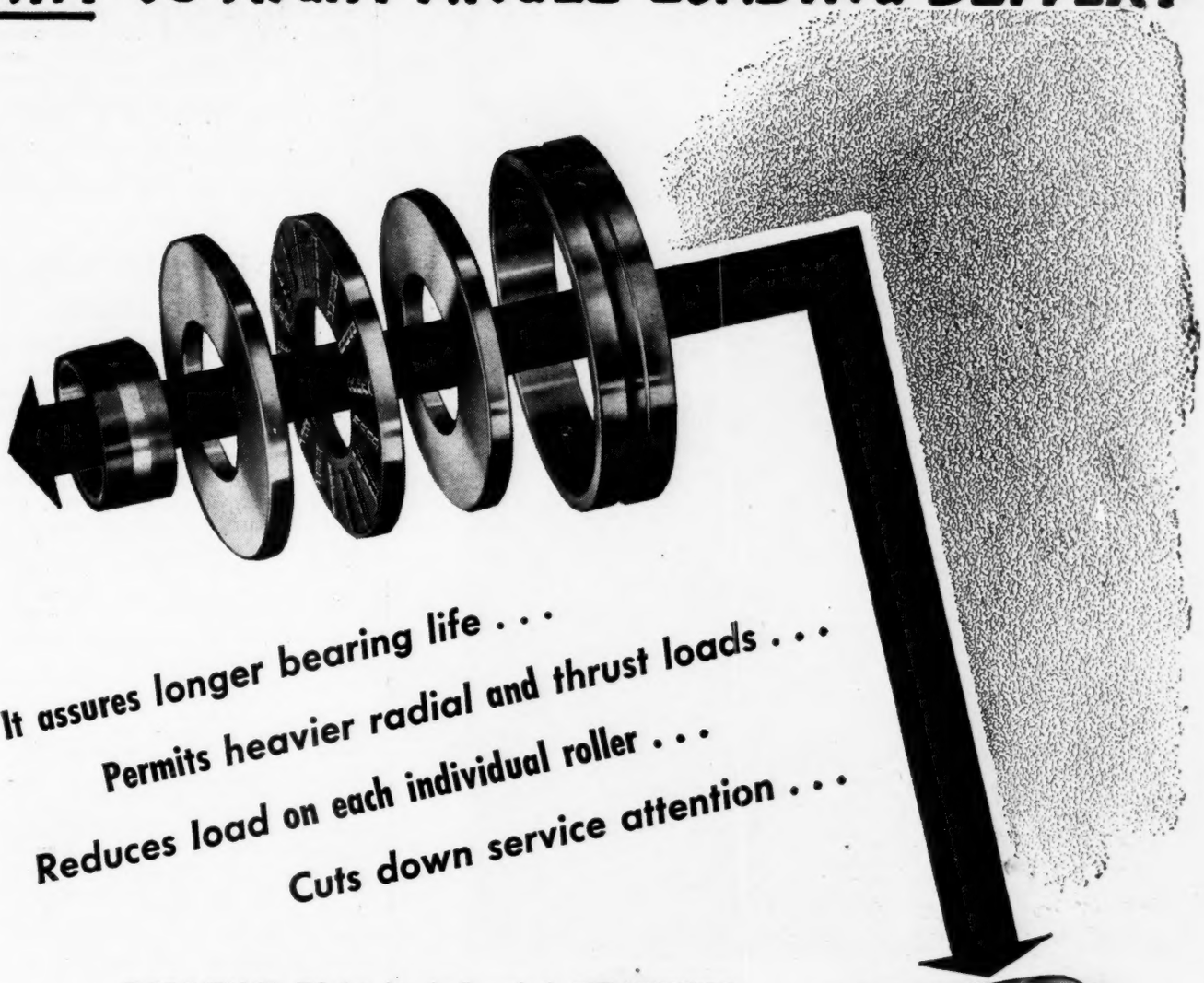

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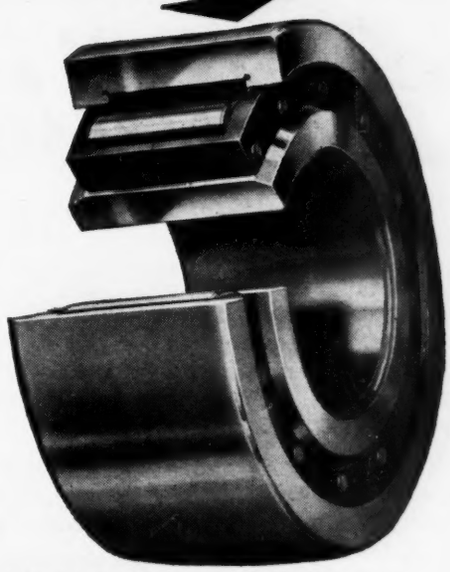

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Rollway CYLINDRICAL ROLLER BEARINGS

Home Builders at the Stevens Hotel, Chicago, Feb. 23-27, 1947, has been announced by the National Coal Association. Over 10,000 home builders and contractors attended the 1946 exposition, which included an attractive and well-attended coal display. Named to the committee for the 1947 display were H. E. Herder, Sahara Coal Co.; Robert Neal, Peabody Coal Co.; Lynn S. Spring, Koppers Coal Division; and Don Snell, Clark Coal Co.

•

Hydro-Electric Plant Protested in Utah

Representatives of coal operators and employees in Carbon County, Utah, recently registered objections to proposed government-sponsored hydro-electric power plants using Colorado River waters.

The protests were heard at a meeting called by State Engineer Ed. H. Watson. B. P. Manley, executive secretary, Utah Coal Operators' Association, and J. A. Theobald, executive secretary, Carbon County Associated Industries, while agreeing that Utah should have her full share of Colorado River water, objected to its possible use for power competing with coal-generated electricity.

•

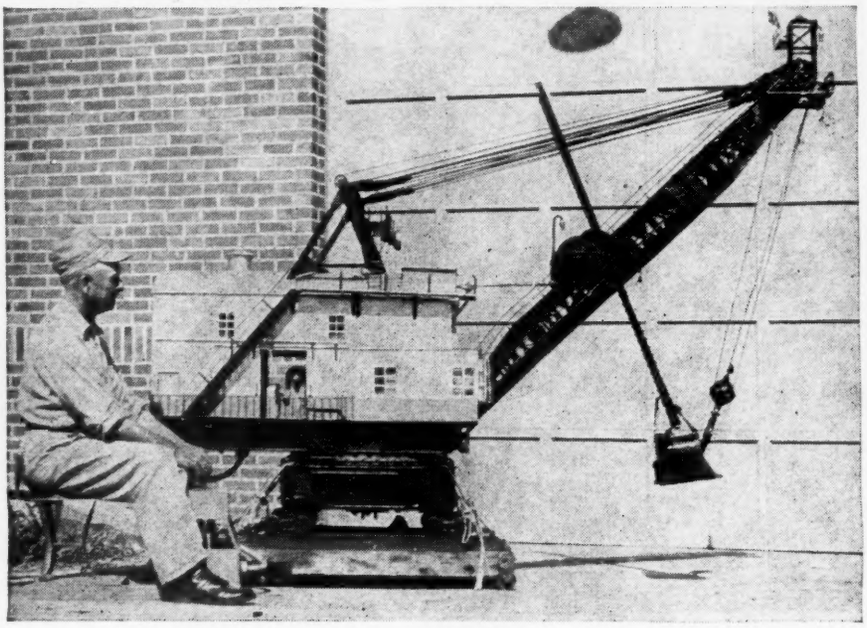
Test Thermal Energy For Home-Heating Use

A practical test of the application of the earth's thermal energy to domestic-heating plants is planned for the coming winter by the Chattanooga Electric Power Board. Five homes, according to the announcement recently, will have installations of a reverse-cycle heat pump operating on water secured from 200-ft. wells. The electrically operated equipment offers a possibility of equalizing power demand throughout the entire year, the power board believes. In fact, a radical change in present electricity and fuel consumption by both utilities and the public is possible if the unit proves economically feasible.

Water secured at the 200-ft. level is expected to maintain a temperature of 58 deg. F. and will be pumped to a refrigerating unit in each house. Heat given off in the refrigeration of the water will be absorbed by the refrigerant gas, the compression of which will generate still more heat. The heat is transmitted to the air circulating through the house by coils. In summer, the unit can be used equally well to cool the house. While the process is not new, this is thought to be the first test of its commercial possibilities in that part of the country. If these tests are successful, it may be possible to use water from the Tennessee River to heat downtown Chattanooga instead of drilling costly wells, according to S. R. Finley, superintendent of the power board.

In addition to equalizing demand, heating by this method is expected to take only one-fourth the electricity used by ordinary resistance-type house heaters and rising power demands have been another factor in the power board's decision to test the unit.

MINIATURE POWER SHOVEL SHOWN BY PITTSBURGH & MIDWAY



Veteran shovel engineer, Jack Ralston, of Mine No. 15, Pittsburgh & Midway Coal Mining Co., sits at the controls of what is believed to be the world's smallest working power shovel. Built by Albert E. Malle, Mulberry, Kan., as a hobby over a period of eleven years, the machine is a scale model complete to every detail and performs perfectly. The unit is geared to move forward or backward and sets on four hydraulic jacks that equalize on oil. Five motors, ranging from ¼ to less than 1/6 hp., control the the mechanism and there are twelve boom cables and five safety cables. The shovel boom is 85 in. long and the dipper stick 59 in. long. The bucket teeth are replaceable and all doors and windows are hinged and equipped with catches. The shovel has been purchased by Pittsburgh & Midway for display purposes.

Employee Insurance Sponsored by P.&R.

Installation of a comprehensive insurance program, embracing hospitalization, surgical, life and accidental-death coverage, for the executive, supervisory, and confidential personnel of The Philadelphia & Reading Coal & Iron Co., was announced early in December by R. E. Taggart, president. One-half the cost is to be borne by the employees, with the remaining half to be paid by the company.

The insurance contract with the Equitable Life Assurance Society of the U. S. will cover more than 1,000 employees of P. & R. and its subsidiary companies. Each employee affected, who will receive the insurance coverage without a medical examination and regardless of present age, will be entitled to $1,000 in life insurance, with an additional $1,000 in the event of death through non-occupational accident—occupational accidents, of course, also being covered under the terms and provisions of the State Workmen's Compensation Act.

In addition, employees will receive, in the event they are hospitalized, $6.00 a day for each day of hospitalization, with a maximum of thirty-one days for each such hospitalization, regardless of any other health or group hospitalization insurance they may privately own. The program also calls for payment of laboratory and other hospital charges up to a maximum of $60 for each hospitalization and reimbursement for surgical fees for an operation up to $150. In the event an employee leaves the company, he can convert the policy, without medical examination, to $1,000 in life insurance for the prescribed rate of his then attained age.

This program originally was announced to employees by Mr. Taggart at meetings in Pottsville Oct. 29-30. In the interim, 98 percent of the eligible employees accepted the program and it became effective Dec. 1.

•

Former Coal Man Honored for Heroism

Posthumous award of the Congressional Medal of Honor to Alexander "Sandy" Bonnyman Jr., former executive of the Blue Diamond Coal Co., Knoxville, Tenn., was announced recently. His widow, now Mrs. James Russell, Santa Fe, N. M., and his daughter, Frances, 12, were to go to Washington for presentation of the medal to the daughter.

Mr. Bonnyman enlisted in the Marines in 1942 and received a battlefield commission at Guadalcanal. On one of several volunteer missions he led an assault on a Japanese pillbox that had resisted previous attacks, and while his charge was successful, he was killed as he reached the top of the pillbox parapet.

Winning Boys Team at Big Sandy-Elkhorn Meet

First prize winners in their division at the Annual Safety Meet of the Big Sandy-Elkhorn Coal Mining Institute at Pikeville, Ky., Oct. 4-5, were members of this first-aid team representing "The Little Beavers" Club, as follows (left to right): Phillip Bradley, Billy Don Mullins, Tommy Edwards, Ray Pritchard, Dickie Blizzard, Burton Bradley and David Blizzard. The club is sponsored by Miss Elsie Johnson (above), associated with the Consolidation Coal Co. (Ky.) and an editor of the *Check Board*, Consolidation's monthly safety bulletin, who is very active among the young people in her community.

Union Pacific Places Largest Diesel Order

In what is thought to be the largest diesel order in railroad history, the Union Pacific announced Dec. 19 that it had ordered 64 diesel-electric passenger, freight and switching locomotives at a cost of $22,000,000. Delivery will allow the U. P. to have all-diesel operations south of Salt Lake City by next fall, according to company officials.

The new equipment consists of seven passenger, 28 freight and 29 switch locomotives and will bring the line's diesel equipment to 66 units for passenger, 112 for freight and 141 for switching use, for a total 421,500 hp. in diesel-electric locomotives, the company stated.

•

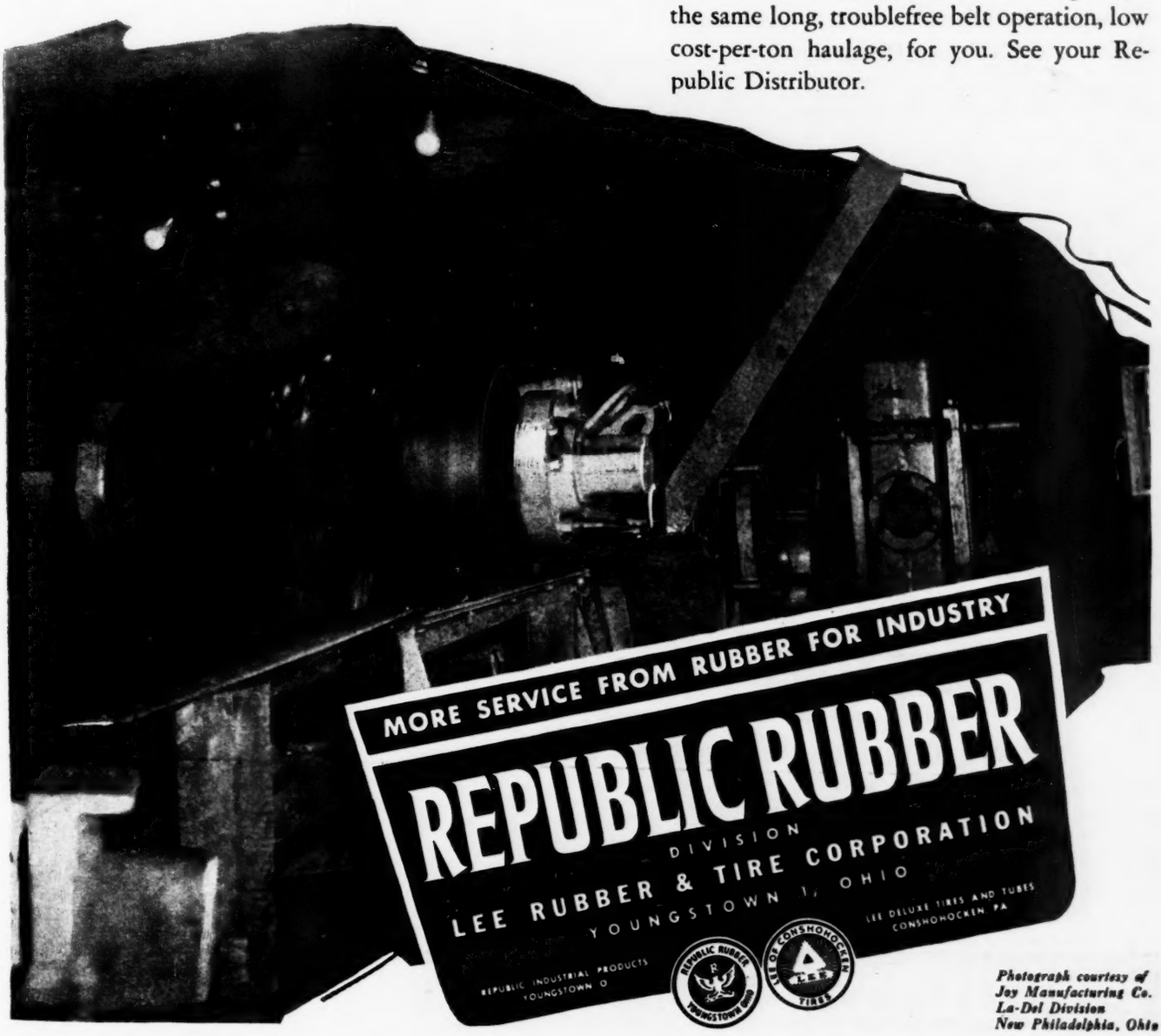
Commission Drafts Ohio Strip Bill

Licensing of strip-mine operators at $50 and posting of a minimum bond of $1,000 were reported last month to be a part of a bill being drafted for the next session of the Legislature by the Ohio strip-mine commission.

The bond would require, according to reports, covering any exposed seams or breaks in the coal when the property is abandoned; cleaning all debris from the land; and the planting of suitable cover crops to control erosion. Operations producing less than 250 tons of material per year would be exempted from the bill.

Picture of uneventful Travel

TON after ton is making the underground trip toward the portal on the typical Republic Conveyor Belt installation shown, without undue event. Impact of the falling lumps is not causing rupture or damage because the belt's resilient construction harmlessly spreads and dissipates destructive forces. Shifting load is not cutting or preceptibly wearing the heavy, abrasion-resisting cover. Moisture present is not even making slow, deteriorating attack on the reinforcing fabric, thanks to Republic's exclusive, permanent mildew-inhibiting treatment—Provar Process. Republic industrial rubber specialists have been building belts that mean continuous uneventful travel for coal, since the early adoption of this handling method . . . can provide the same long, troublefree belt operation, low cost-per-ton haulage, for you. See your Republic Distributor.



Photograph courtesy of Joy Manufacturing Co. La-Del Division New Philadelphia, Ohio

Overseas Coal Notes

ENGLAND — British coal production showed improvement in September and October, with tonnages for those months running 3.4 and 4.1 percent over the same months in 1945. For the week ending Nov. 2, output per man-shift rose to 1.06 tons, the highest since 1942. Preparation of plans for saving coal continued, however, during November. Current estimates by the Ministry of Fuel and Power indicated an anticipated supply 5,000,000 tons short of demands for the year ending April 30, 1947. While this is half the deficit estimated last June by the government, it was thought likely that systematic shutdowns of "non-essential" industry would be called for in an effort conserve the supply for more essential needs.

Amid a crucial fuel crisis that was rapidly threatening to shut down many of its industries, the British Government Jan. 1 formally took over the nation's coal mining industry. Plans for mechanization of the mines and increased production were immediately announced.

LONDON—British coal miners will have a five-day working week after May 5, 1947, it was announced Dec. 19 by the National Coal Board. The decision was made after the Board received assurances from the miners' union that full cooperation on the maintenance of output would be given. The new working conditions are now being discussed and those unsettled by February will be submitted to arbitration.

WARSAW, POLAND—The Polish coal-mining industry reached its 1946 target of 46,000,000 tons on Dec. 21, it was reported, with another 1,000,000 tons expected by the end of the year. The goal for 1947 has been set at 60,000,000 tons, which will make Poland the largest coal producer on the Continent and second to Britain in Europe. Half the 1947 production is expected to be available for export, with 13,000,000 tons going to Russia.

PARIS (McGraw-Hill Worlds News)—The French Government's detailed four-year modernization plan, made public late in November, calls for $12,400,000 in coal-mine equipment from the U. S. over the next four years, beyond the $4,160,000 of such equipment already ordered for 1946 delivery.

Including smaller orders placed with Great Britain and other European countries, the French hope during the period 1946-50 to obtain the following machinery from abroad: 264 longwall cutters; 228 shortwall cutters; 219 Joy and Eimco loaders; 266 duckbills; 406 chain conveyors; 39 back-filling machines; 63 jumbos; and 28 underground compressors.

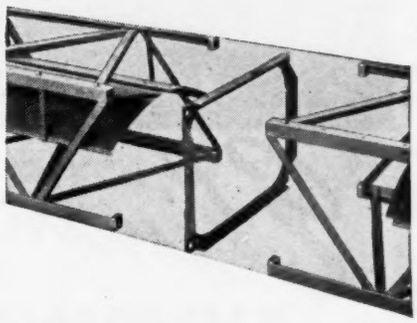
It is hoped to raise the country's coal output from about 50,000,000 metric tons in 1946 to 55,500,000 tons in 1947 and up to 65,000,000 tons in 1950, by installation of this new machinery, electrification of many mines now using only compressed air and grouping of underground operations around new, larger shafts using skips.

Expansion of operations in the thick seams in the Lorraine basin will be emphasized somewhat more than in the major

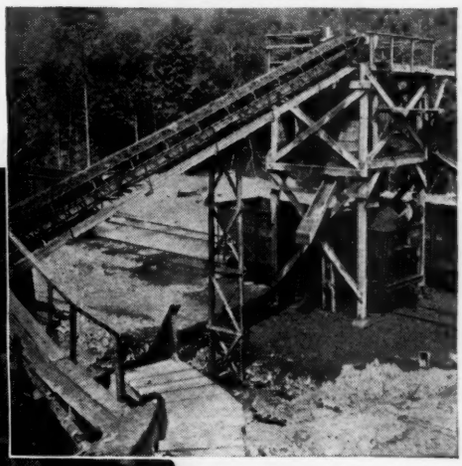
Why B-G Conveyor Truss Construction cuts installation costs

• This frame—Barber-Greene's Truss Frame—saves days of construction time and the added expense of extra and elaborate piers and supports. You can employ longer spans with less blocking than with any other type of conveyor frame—yet be assured of true alignment under the heaviest load. Slope installations require fewer A-frames. Walkways can be attached without building additional framework.

You'll benefit from the many other advanced B-G Conveyor features, too—*pre-engineered*, factory-assembled terminals that operate at top efficiency and reduce maintenance expense—self-contained, *standardized* units that can be bolted together quickly . . . easily altered and moved. Our mining engineers will be happy to help you plan the mechanization of your mine. Write for information. Barber-Greene Company, Aurora, Illinois.



Note the sturdy construction of the B-G Truss Frame. Requires fewer A-frames or supports than ordinary conveyors.



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B-G Barber-Greene CONSTANT FLOW EQUIPMENT

LOADERS • PERMANENT CONVEYORS • DITCHERS • PORTABLE CONVEYORS • FINISHERS • BITUMINOUS PLANTS • COAL MACHINES

fields of northern France, where the seams are very thin and twisted.

GERMANY—The German public was looking forward to an extremely uncomfortable winter, after miners in the Ruhr area rejected by an overwhelming vote Nov. 16 a military government proposal that they work one extra Sunday shift a month to provide coal for domestic heating. The union had previously agreed to the plan but the miners maintained that their leaders had not consulted them.

A breakdown of the four-power allocation of German coal was recently admitted by Brig. Gen. William H. Draper, Jr., chief of the American military government's economic division. The exchange of coal with the Russian area had been transferred from an allocation basis to barter between the Ruhr area and the Russian sector.

The decision of the British military government early in November to stop all exports of coal from the Ruhr was seen as particularly hard on the French. The French economy is now short of 1,000,000 tons monthly for reconstruction purposes, and with the Ruhr supply cut off, not only will the extra 1,000,000 tons needed be lost but an additional deficit of 600,000 to 700,000 tons must be faced. Protests were immediately planned by the French Government.

RUSSIA—Lagging coal production in the Moscow and Kuznetz coal basins, two of the country's most important mining areas, was severely criticized Nov. 17-18 in *Pravda* and the *Moscow Bolshevik*, official government newspapers. In the Kuznetz basin, it was said, operating costs to produce a ton of coal have risen to 103 percent greater than those in 1940. Production itself has also dwindled, it was reported, with tonnages in one area only 8.7 percent of that before the war and in another only 28 percent. In the Moscow basin, one trust had fulfilled only 54 percent of its plan for the third quarter and only 42.5 percent of its October quota. The main reasons for the lag, it was said, were the failure to provide better living conditions for miners and the reluctance of engineers and mine managers to go underground to personally supervise the work. In the Kuznetz area only 200 of 430 engineers work below the surface, *Pravda* said.

New efforts to spur production in the Don basin were reported in *Pravda* Nov. 25. The proposals included strengthening Communist party membership in the mines to influence the miners and drafting "on a voluntary agreement" of 4,500 collective farmers from the region for work in the mines.

Moscow (McGraw-Hill World News)—Reports reaching here state that new coal mines are being launched in the eastern regions of the Soviet Union. From the Karaganda basin in the Kazakh SSR it is reported that the first large mine at the new Saran deposit is nearing completion and four more are being sunk. A town for 30,000 inhabitants is going up in the vicinity for the builders and miners.

It is said also that a new open-cut mine with an annual output of 600,000 tons is scheduled to begin production at the

HOW *We* **Fabricate** A COAL PREPARATION PLANT

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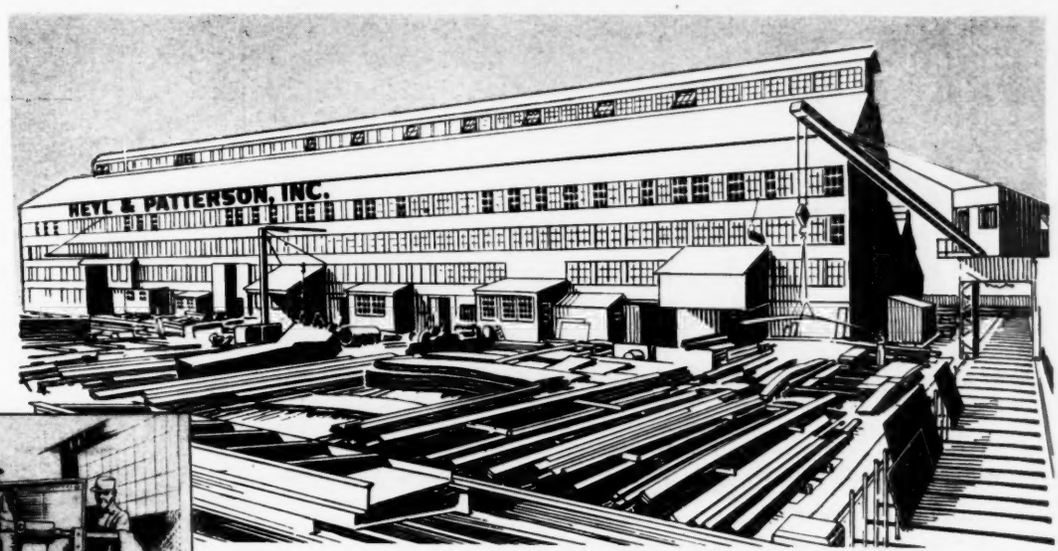
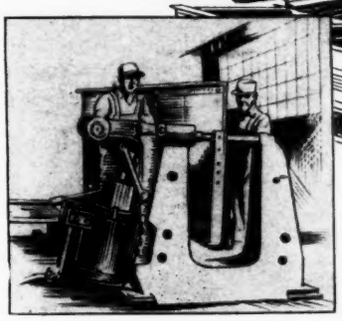
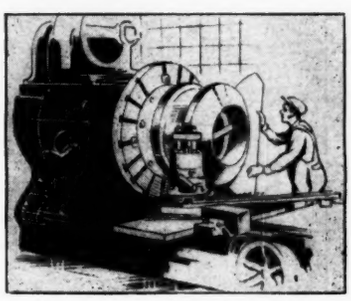
2. Engineering
3. Fabrication
4. Erection
5. Service
6. Cooperation







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We machine the parts and assemble them into complete machinery units before shipping them to the field for erection.

We fabricate the machinery bases and structural frames, so that, when shipped to the field, the machinery and structural units fit together accurately. Finally, we fabricate the structural parts of the buildings to house these integrated machinery units.

Complete fabrication, carefully supervised and tested in our own spacious shops, is an important link in the dependable and economical operation of Coal Preparation Plants which have been engineered by Heyl & Patterson for almost half a century.

Rotary Mine Car Dumpers
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Bradford Breakers
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"SINCE 1887"

55 WATER STREET · PITTSBURGH 22, PA.

Baturin deposit in the southern Urals. All operations will be completely mechanized.

MELBOURNE (McGraw-Hill World News)—Mechanization in New South Wales coal mines, which produce 83 percent of Australia's bituminous coal, has been held in abeyance by an amendment to the New South Wales Coal Mines Regulations Act that vests in the Minister of Mines discretion in permitting loading devices for pillar extraction. No mention is made of coal-cutting machines, which, it is held, would be more likely to cause accidents than would loaders. The minister, in introducing the measure in the Legislative Assembly, stated that it was designed to insure safe mining and if it could be established to his satisfaction that particular machines could be operated without danger, permission for their use would not be withheld. But no mine has yet succeeded in providing that degree of satisfaction, so that for all practical purposes none are allowed in use.

CALCUTTA, India (McGraw-Hill World News)—India must sharply increase her coal production to meet the rapidly rising demands of industry, Sir S. N. Roy, National Coal Commissioner, recently told the second annual meeting of the Council of the Geological, Mining and Metallurgical Society of India.

Stressing that world demands indicated India would have to develop her own deposits and forget the possibility of imports for some years to come, the Commissioner estimated India's present coal requirements for domestic and industrial needs at 32,000,000 tons. This, he said, meant tonnage would have to total at least 35,000,000 tons, compared with the present 29,000,000-ton total.

He proposed the following five-point program to make more coal available as rapidly as possible: (1) make comprehensive surveys of all new fields; (2) set up a program to conserve coal for more essential industrial uses; (3) act quickly to develop other sources of power; (4) press all forms of coal research; and (5) establish a central office to coordinate all sources of power and oversee the research program.

He also suggested that India might do well to try to regain her coal-export trade, even at the cost of importing some requirements at first, to develop better trade relations with neighboring countries and assist Indian shipping.

A recommendation that the State take over the rights to coal in the Bengal-Bihar area as the first step towards possible nationalization of the entire industry in India was the highlight of the report of the India Coalfields Committee recently submitted to the government. The committee, appointed in December, 1945, to study expansion and conservation plans, also urged creation of a new Central Department of Fuel and Power and establishment of a National Coal Commission to take over the collieries supplying the nationally-owned railroads and to act as a controlling agency for the industry. Conservation of resources and development of facilities also were covered in the report, which is being prepared for publication. The committee estimated that consumption was likely to increase to

This Bit cut coal drilling time *from 1½ hours to 5 minutes*

. . . PAID FOR ITSELF IN THE ONE OPERATION

Here are the facts according to a performance test in a Johnson County, Kentucky mine:

Job . . . to drill five holes in the face of Miller Creek No. 1 seam coal to a depth of 5 feet.

Equipment . . . a Jeffrey A-7 hand-held drill, steel bits, and a Kennametal HD-1¾" bit.

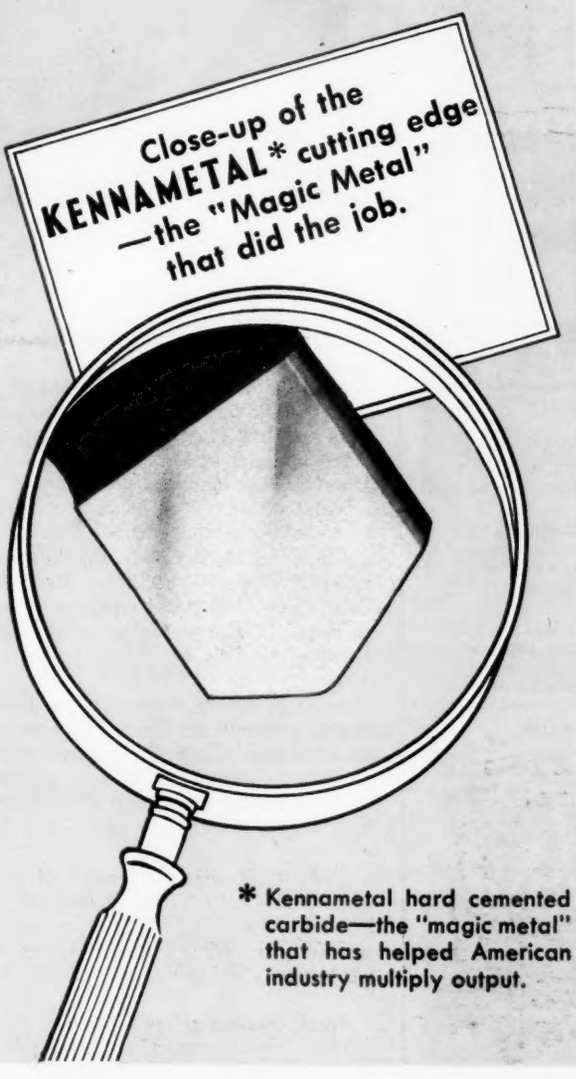
Test . . . to compare the drilling time of ordinary steel bits and Kennametal bits.

Results . . . it took four men operating the drill 1½ hours to do the job when using steel bits. It took two men only 5 minutes to do the job using Kennametal bits. Depth, number of holes drilled, and coal were all identical. This bit paid for itself in the one operation. *Kennametal bits not only drill fast . . . they are economical besides!*

This is another example of unbelievable performance where Kennametal cutting edges are being used. It helps explain why this amazing metal keeps bringing high production at low cost to more and more coal mines every day.

Kennametal cutting edges are harder than any metal ever successfully used in the cutting edge of a bit made for drilling. High compressive strength makes it take repeated shock, and not fail. Its extreme hardness enables it to take a beating, outlast, stay sharp, and do tough drilling jobs that ordinary steel drills won't touch.

We will be glad to have our representative covering your district contact you. Simply drop a card to the Mining Division, Kennametal Inc., Latrobe, Pa.



* Kennametal hard cemented carbide—the "magic metal" that has helped American industry multiply output.

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39,000,000 tons within ten years and production of 42,000,000 tons yearly must be obtained by that time.

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Personal Notes

Cadwallader Evans Jr., formerly vice president and general manager, has been elected president of The Hudson Coal Co., Scranton, Pa. **G. B. Fillmore,** vice president in charge of sales, has been elected senior vice president, and **Edgar C. Weichel,** formerly assistant general manager, operating, has been named general manager. Elected to the board of directors were **C. H. Welles Jr.** and **R. S. Houck** of Scranton, and **Cornelius J. McCole** of Wilkes-Barre.

Cadwallader Evans Jr.

Clyde W. Woosley, formerly general superintendent, Pyramid mine, Pyramid Coal Corp., Pinckneyville, Ill., has been named general purchasing agent for the Binkley Mining Co. and its associated companies, with headquarters at the Pyramid mine. **Hubert Howard** has been appointed office manager at the Pyramid mine and **Len Hartwell** has been promoted to field superintendent.

Frank Smith, formerly superintendent, Keen Mountain (Va.) mine, Red Jacket Coal Corp., has been appointed superintendent, Leatherwood (Ky.) mine, Blue Diamond Coal Co.

James F. Bryson, formerly safety director, Harlan County Coal Operators' Association has been named compliance agent, SFAW, La Follette, Tenn., and has been succeeded by **E. A. Starling,** previously safety director, Blue Diamond Coal Co., Knoxville, Tenn.

Harry G. Lovelace, manager of mines, Carrs Fork Coal Co., Inc., Crummies, Ky., has been appointed mining engineer for the Kentucky Department of Mines, with headquarters at Lexington.

Frank Badda, safety engineer, Northwestern Improvement Co., Roslyn, Wash.,

has been promoted to the position of assistant superintendent.

Edward Griffith, formerly vice president and general manager, has been elected president, Glen Alden Coal Co., Scranton, succeeding **William W. Inglis,** resigned.

Bachrach

Edward Griffith

Mr. Griffith began in the mines during his school vacations and in 1902 joined the Lehigh & Wilkes-Barre Coal Co., which was later merged with Glen Alden, as a clerk. He held various administrative and supervisory positions in both companies and was named vice president and general manager of Glen Alden in 1934. Both Mr. Griffith's father and grandfather were officials of the Lehigh & Wilkes-Barre Coal Co.

Thomas H. Miller has been named assistant director of the U. S. Bureau of Mines, to succeed **George A. Lamb,** who has resigned to enter private industry. Before coming to Washington in 1940, Mr. Miller was associated with the Bureau's metal statistical and economic work at Salt Lake City.

E. W. Potter has been appointed production engineer for the Koppers Coal Division mines under the supervision of A. P. Boxley, general superintendent, with offices at Kopperstown, W. Va. **R. B. Calmes** succeeds Mr. Potter at the company's Pittsburgh office. **J. D. Kalasky,** formerly assistant ventilation engineer at the Pittsburgh office, has been appointed resident engineer at the Stotesbury mine of the Koppers Coal Division, Stotesbury, W. Va., succeeding **Felix Schleenvoight,** recently transferred to Everettville, W. Va.

William Muncie, assistant on machine mining, has been appointed mine foreman, Olyphant colliery, The Hudson Coal Co., Olyphant, Pa.

James H. Winning, Pikeville, and **Eddie Rowe,** McRoberts, have been appointed Kentucky district mine inspectors by Gov. Simeon Willis.

Paul D. Hess, Overland Park, Kan., has been named to the field staff of the Coal

Heating Service division, National Coal Association. Mr. Hess' experience in the coal industry covers 14 years in engineering and production capacities and a similar period in wholesale and retail activity.

Donald B. Bradley, for the past 6½ years field supervisor for the Bituminous Coal Producers Advisory Board of Illinois, has been appointed field representative in the Middle West for the Coal Heating Service division, NCA.

Fletcher McCrae, Rolla, Mo., has been appointed mine engineer, Rapatee mine of the Midland Electric Coal Corp., Farmington, Ill. Before his war service as a captain in Army Engineers, he was associated with the Kennecott Copper Co., at Hurley, N. M.

Arch J. Alexander, president, Appalachian Coal & Lumber Co., Charleston, W. Va., was named Jan. 2 by Gov. Meadows to become chief, West Virginia State Department of Mines, for a term ending Dec. 31, 1949, succeeding **G. R. Spindler,** who resigned to join the Joy Mfg. Co., Pittsburgh. Mr. Alexander, a native of Charleston, was graduated from Washington & Lee University and began his work in coal mining some years ago as a trackman. He was employed in various supervisory positions by the Pittsburgh Coal Co., Central Elkhorn Coal Co., Island Creek Coal Co., Carbon Fuel Co. and others, until organizing his own company recently.

C. E. St. John, mechanical engineer for the Glen Alden Coal Co. since 1921, has been appointed superintendent of the company's Exeter shop. **John Hannigan,** assistant superintendent of construction, has been named mechanical engineer to succeed Mr. St. John.

Ralph A. Lambert, general manager, Pennsylvania Coal Co., since 1943, has been elected a vice president of the firm. He will continue as general manager.

H. A. Quenon, superintendent, Keystone mine, Koppers Coal Division, has been named general superintendent of the Federal division, which includes Federal No. 1 and Federal No. 3 mines. Mr. Quenon succeeds **E. F. Miller,** who has resigned because of a change of location necessitated by the illness of his wife. **C. A. Perdue,** superintendent, Long Branch mine, has been appointed to replace Mr. Quenon at Keystone.

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Obituary

L. M. Webb, 71, president, Webb Coal Co., operating mines at Garrison, W. Va., died suddenly Dec. 18 at his home in Cincinnati, following a heart attack. Mr. Webb had been active in coal mining since 1910.

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Association Activities

Western Kentucky Mining Institute Nov. 26 elected Arthur Wilson, Browder, Ky., president, succeeding William Kington, Madisonville.

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Preparation Facilities

Princess Dorothy Coal Co., Robin Hood, W. Va.—Contract closed with Kanawha Mfg. Co. for conveyor system bringing newly opened No. 2 Gas coal to existing tipple for either loading as straight mine-run or screening into various sizes; coal fed from 800-ton drop-bottom bin to 450-ft.-long declined belt conveyor delivering to tipple.

Chance Coal Cleaner Installation, Chimbodi, Peru—Contract closed with Wilmot Engineering Co. for one 5-ft.-diameter Wilmot Hydrotator to prepare barley coal; No. 4 coal; feed capacity, 45 t.p.h.

Tuscarora Stripping & Mining Co., Tuscarora, Pa.—Contract closed with Wilmot Engineering Co. for one 6-ft.-diameter Wilmot Hydrotator to prepare barley coal; feed capacity, 60 t.p.h.

Lando Coal Corp., Puritan, W. Va.—Contract closed with McNally-Pittsburg Mfg. Co. for complete washery addition having an input r.o.m. capacity of 400 t.p.h., washing 360 t.p.h. of 7x0-in. in two McNally-Norton automatic washers; raw coal feed split at either 1½-in. or 1¼-in. for separate washing; all plus 7-in. raw

coal screened from r.o.m. hand cleaned and loaded directly to cars; middle-gravity products from coarse-coal washer crushed and retreated in fine-coal washer; combined washed coals from both washers classified on single washed-coal screen into 7x5-, 5x3-, 3x2- and 2x1-in; 1-in.-minus coal classified on vibrating screens; 1x¼-in. with the ¼x0-in. centrifugally dried; complete mixing and blending facilities of all washed products available; existing r.o.m. and raw-coal screening facilities will be utilized, as well as present loading-boom equipment.

Roberts & Schaefer Co., for Industrial Collieries Corp., Marianna, Pa.—Contract closed with Jeffrey Mfg. Co. for two 7-ft. 3-compartment Baum jigs; capacity, 300 t.p.h. 6x0-in. raw coal feed.

Koppers Coal Division, Kopperstown, W. Va.—Contract closed with Roberts & Schaefer Co. for Stump Air-Flow coal-cleaning plant; capacity, 100 t.p.h. of ⅜x0-in. coal.

Ingle Coal Corp., Elberfield, Ind.—Contract closed with Roberts & Schaefer Co. (Templeton-Matthews Co., engineers) for Menzies tandem hydro-separator coal-cleaning equipment; capacity, 125 t.p.h. of 6x⅜-in. coal.

Allegheny River Mining Co., Cadogan mine, Cadogan, Pa.—Contract closed with Roberts & Schaefer Co. for pneumatic coal-cleaning equipment; capacity, 40 t.p.h. of ⅜x0-in. coal.

Mt. Hope Coal Co., Holcomb, W. Va.—Contract closed with Roberts & Schaefer Co. for hydro-separator coal-cleaning equipment for cleaning 6x¾-in. coal; capacity, 75 t.p.h.

Industrial Collieries Corp., Marianna, Pa.—Contract closed with Roberts & Schaefer Co. for complete coal-cleaning plant, using Jeffrey Baum-type jigs; capacity, 600 t.p.h. of 5x0-in. coal.

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Coal Publications

Safety Record of Mine No. 7, Island Creek Coal Co., Holden, Logan County, W. Va., by A. U. Miller and C. E. Linkous, U. S. Bureau of Mines. I.C. 7365; 8 pp., 8x10½-in.; paper; mimeograph; free. From 1936 to 1945 inclusive, this mine produced 11,273,675 tons of coal, or 2,254,735 tons per fatality, about four times as good a record as that of the coal mines of the United States. From May 4, 1942 to May 31, 1945 the mine worked 3,156,070 man-hours and produced 4,910,687 tons of coal without a fatality.

Rating and Training Executives and Employees, A.M.A., Personnel Series 100; 43 pp., 6x9-in.; paper; price, 75c. Considers employee selection for average company, techniques of merit rating, executive development and interpretation of personnel reports.

Review of Fischer-Tropsch and Related Processes for Synthetic Liquid Fuel Production, by N. R. Golumbic, U. S. Bureau of Mines. I.C. 7366; 28 pp., 8x10½-in.; paper; mimeograph; free.

The Practical Way to Handle Grievances, Labor Relations Institute, 1776 Broadway, New York 19, N. Y. 58 pp., 5⅜x8½-in., paper; price, $2.25. Recommends employee attitude survey and an unsigned "gripe form" to be dropped in a company "gripe box."

The Industrial Republic, by P. W. Litchfield, Goodyear Tire & Rubber Co., Akron Ohio. 224 pp., 5⅞x9¼-in.; cloth; price, $4. "An all-powerful labor union is just as bad as an all-powerful corporation or an all-powerful State." The book outlines a plan for American production—industrial democracy.

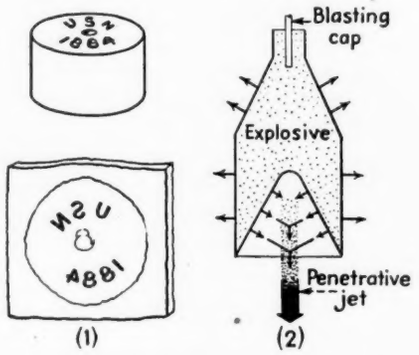
Coal-Research Activities of the Bureau of Mines, by Arno C. Fieldner, U. S. Bureau of Mines. I.C. 7367; 14 pp., 8x10½-in.; paper; mimeograph; free. Review of activities and purposes of the bureau relative to research into the properties of coal, the health and safety of coal miners, the preparation, combustion, carbonization, gasification of coals, and the liquid fuel to be obtained from them.

Have You Considered Overfire Jets for Smoke Abatement? by W. S. Major, Bituminous Coal Research, 912 Oliver Building, Pittsburgh 22, Pa. 8 pp., 8⅝x11¼-in.; paper. "Jets an added tool to help furnace attendant in smoke abatement."

Storage of Subbituminous Slack Coal in Open Pits, by J. B. Goodman, V. F. Parry and W. L. Landers, U. S. Bureau of Mines. R.I. 3915; 46 pp., 8x10½-in.; paper; mimeograph; free. Advises coal-storage plants to lay coal in superposed benches not more than 2 ft. deep, to run bulldozer or tractor over pile surface to compact and seal it, to compact hot spots by dropping heavy roller or loaded clamshell bucket on such spots before serious heating, to drag surface frequently to seal it with fine coal, to explore suspected hot areas with pointed ¼-in. pipe, leaving it in place for 5 min., and if, after removal, water sizzles in contact with pipe, or if pipe is discolored, or if a hot spot has developed in storage pile, to dig out such coal, extinguish it and replace it with fresh coal.

Explosions and Fires in Bituminous Coal Mines, U. S. Bureau of Mines, Miners' Circular 50, Coal-Mine Accident-Prevention Course, No. 4, 107 pp., 5⅞x9⅛-in.; paper, price, 25c., (apply Supt. of Documents, U. S. Government Printing Office, Washington 25, D. C.).

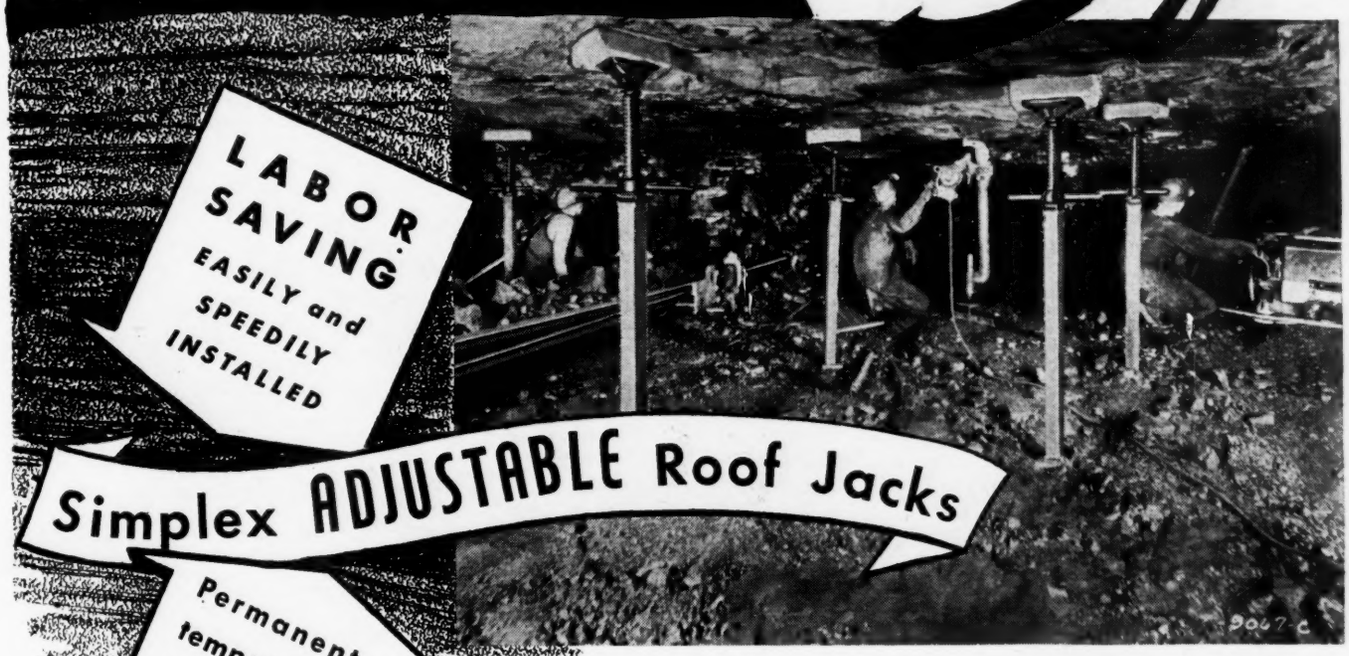
Application of Shaped Explosive Charges to Mining Operations: Tests on Steel and Rock, by R. S. Lewis and G. B. Clark, Department of Mining Engineering, University of Utah, Salt Lake City, Utah, Bull. No. 1. 48 pp., 6x9-in.; paper, price, $1.25. Describes tests of the Munroe, or bazooka, explosive principle.



(1) On detonating guncotton, letters and numerals sunk in guncotton emboss these characters in reverse in iron plate by which they are faced. (2) Conical cavity in face of explosive causes a highly penetrative jet to be formed along axis of explosive.

Fuels and Fuel Burners, by K. Steiner. 394 pp., 5½x8½-in., cloth; price, $4.50. McGraw-Hill Book Co., 330 W. 42d St., New York 18, N. Y. Covers nature, occurrence and properties of fuels from viewpoint of domestic and commercial heating and design, construction and operation of stokers, oil burners, and gas burners used in heating plants of residences, commercial buildings and steam plants of moderate size, also wood fuel. Automatic control methods, and apparatus for heating systems including usual electrical types and the more recent electronic developments.

SOFT ROOFS made Safe



LABOR SAVING
EASILY and SPEEDILY INSTALLED

Simplex ADJUSTABLE Roof Jacks

Permanent or temporary support of roofs, cross timbers, steel beams and rails.

MORE WORKING SPACE *with Strength and Safety!*

Trim and slim—no wasted girth—more space for loading machines and conveyors to work in—yet *safer* than wood posts many times their size. Both M-8 and M-16 types have heat-treated screws, 1½" and 1⅞" diameters respectively, and 2" and 2½" steel tubing respectively.

Capacity of light-duty M-8 Jack is eight tons. Heavy-duty M-16 Jacks, 16 tons capacity. Both tested for overload. Built with lever operating handle, as at right, or with combination slide and drop operating handle, and with corrugated bases and removable heads for any type of roof supporting member.

M-9 and M-17 Roof Jacks have screw base assembly only for use with standard pipe supplied by the user.

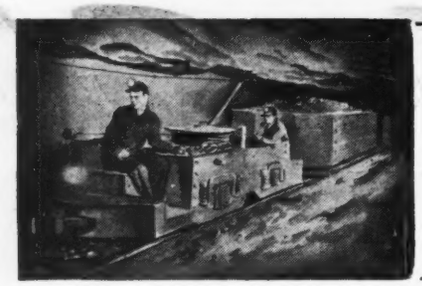
Simplex Jacks for every mining purpose . . . described in Catalog No. 45, yours for the asking. Write today.

M-8 with Lever Nut Operating Handle. Type "FS" Flat Swivel Head is drop-forged steel. (Used with wooden cap pieces.)

Type "C" Head for square and round timbers, large steel beams.

Type "FF" Head for use with small "H" beams and rails.

TEMPLETON, KENLY & CO., CHICAGO 44, ILLINOIS



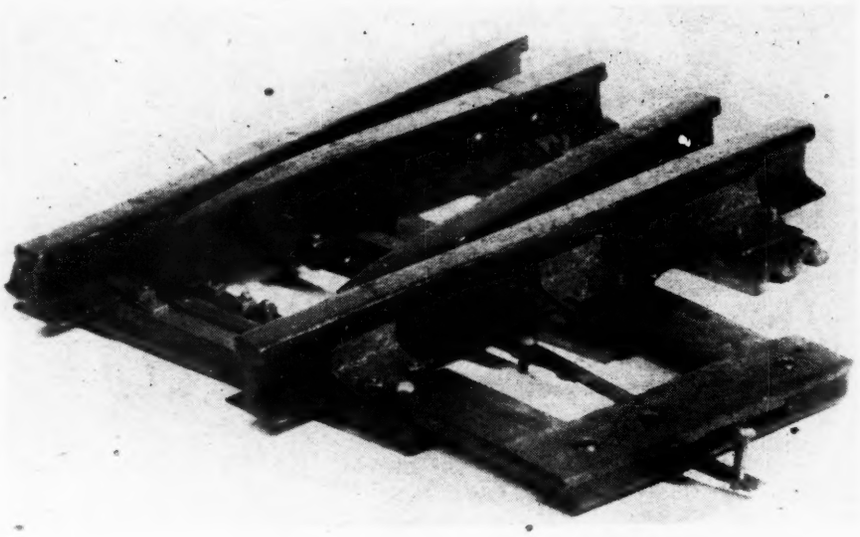
Equipment News

More Detailed Information and Descriptive Literature Normally Are Available on Request Directly to the Manufacturer

Switch

A newly improved rail switch is now available from the Steel Switch Tie Co., Huntington 1, W. Va. The device is applicable to steel rail from 16 to 40 lb. and will fit any gage or length of switch points, according to the manufacturer.

The switch can be laid in 45 minutes at a saving of $6 to $7 over a wooden switch, it is said, and can be relaid from two to 150 times. The device also features a safety bar that protects the switch and aids in rerailing wrecked mine cars.



Heaters

A foot warmer for slate pickers and a locomotive-cab heater have been developed by the Guyan Machinery Co., Logan, W. Va. The foot warmer, designed so that the worker stands on it while at a picking table, measures 16x19x2 in. and, according to the manufacturer, has a 350-watt consumption at 220 volts and 70 watts at 110 volts.

The locomotive-cab heater is compact in design, measures 6¾x11¾x4 in. and consumes 1,500 watts on a 250-volt circuit, it is said.

Starter

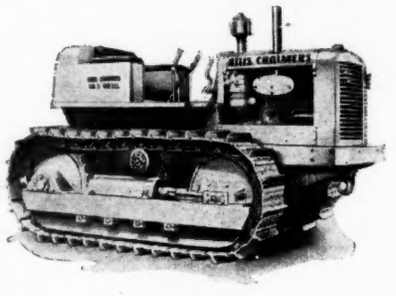
A new permissible gasproof starter has been announced by the Ensign Electric & Mfg. Co., Huntington, W. Va. Incorporating the Clark patented vari-time method of acceleration, this equipment provides definite time starting without the use of further relays, according to the manufacturer. The start-stop lever also resets the overload relay and special lid construction eliminates loss of studs.

Approval by the U. S. Bureau of Mines at present covers up to 20 hp. at 230 volts in the non-reversing type. Other types and sizes are being prepared, according to the company.

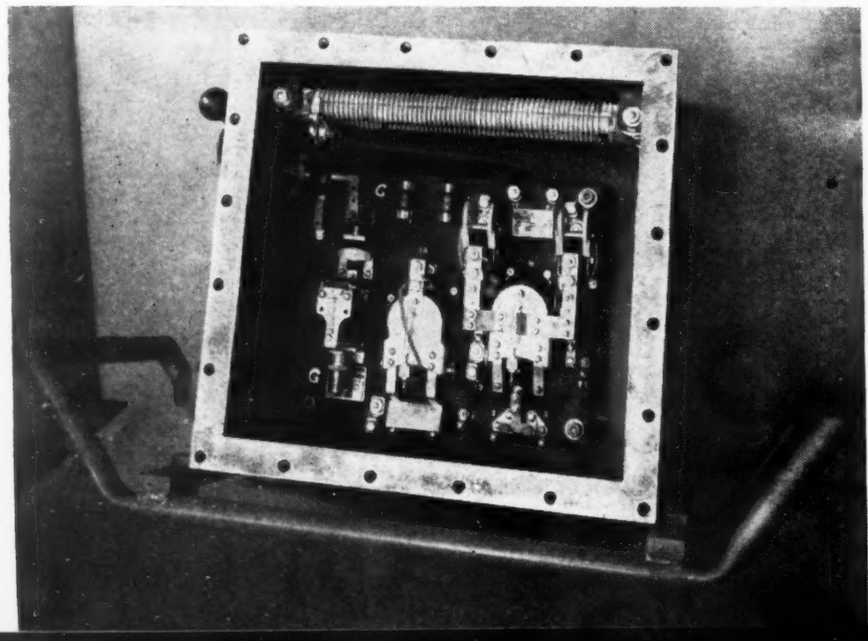
Tractor

The Allis-Chalmers Mfg. Co., Tractor Division, Milwaukee 1, Wis., recently announced its new HD-5 as another addition to the company's crawler-type tractor line. This 37-hp. tractor is said to be a modern economical unit engineered completely new throughout.

Among the features cited, the grease-packed truck wheels, idlers, and support rollers on the unit are serviced at the factory and thereafter require greasing attention only once every 1,000 hours, thus reducing service time and expense. The unit employs a General Motors two-cycle diesel engine with unit injection, four-way cooling and parts that are interchangeable with other Allis-Chalmers 71 series tractors. Accessible controls and convenient gear-shifting arrangements that give five speeds forward, ranging from 1.46 m.p.h. to 5.47 m.p.h, and a reverse speed of 2 m.p.h., eliminates much unnecessary operator fatigue, it is said.



An A-frame track stabilizer design enables the HD-5 to absorb shock, eliminates twisting strains and provides rigid track alignment, according to the manufacturer, and a choice of two different track gages, a 44-in. and 60-in., plus 5 ft. 4¼ in. of track on the ground, provide the HD-5 with excellent ground contact, excellent balance and reliable traction, it is said. For special assignments allied equipment is available, such as the new hydraulic Tracto-Shovel manufactured by the Tractomotive Corp., Findlay, Ohio. Straight- and angle-type bulldozers also have been specifically engineered by Baker and Gar Wood to meet the needs of the new HD-5.



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PERMASET PRE-FORMED

The Focal Point of Profitable Mine Operation

The entire effort of your underground personnel and equipment is devoted to feeding your production hoist. A dependable operator, efficient and reliable machinery, and the *best* in wire rope—these are your assurance of uninterrupted production. Shaft mine operators obtain greatly increased tonnage from J&L Precisionbilt Lang Lay PERMASET hoist ropes. Improve your winding practice by specifying J&L Precisionbilt wire rope—made for longer service from J&L Controlled Quality steel.

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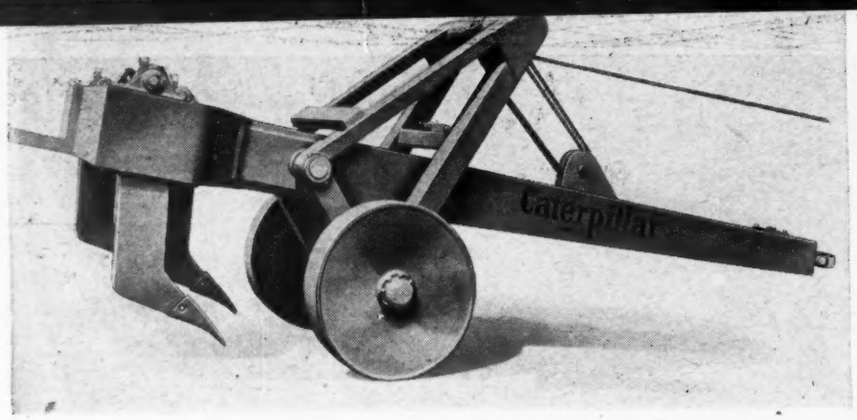
PITTSBURGH 30, PENNSYLVANIA

J&L *Precisionbilt* PERMASET PRE-FORMED WIRE ROPE



Rippers

Production of two sizes of cable-operated rippers has been announced by the Caterpillar Tractor Co., Peoria, Ill. The No. 28, built for use with one or two D8 tractors, and the No. 18 for use with a single D7 or D8 tractor, are said to be sturdy machines designed to do the toughest ripping jobs in a way that substantially speeds up scraper loading time and reduces wear and tear on scraper cutting edges and bowls.

Both models are equipped with three teeth which are detachable if less are required. Replaceable tips of the teeth are of heat-treated alloy. While maximum depths of penetration are 28 in. for the No. 18, and 30 in. for the No. 28, accurate control permits the operator to rip material to any depth up to the maximum, according to the manufacturer. The rippers are operated by a rear cable control on the tractor.

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Mesh Screen

The C. O. Jelliff Mfg. Corp., Southport, Conn., has announced that Lektromesh, which was produced mainly for military uses during the war, is now again available to industrial users of metal screening and filter cloth.

Lektromesh is a one-piece solid metal product, with no woven or other foundation structure; it cannot ravel and is extremely resistant to tearing, according to the manufacturer. The product supplements, however, rather than competes with woven wire and is most applicable in the finer sizes beyond the limits of perforated metal, and where applications differ from those of woven wire of comparable mesh size. Hole diameters are extremely accurate and the screen presents a smooth surface finish equal to that of perforated mesh. It is stiff, strong and wear-resistant, and is readily fabricated by drawing, stamping, welding, soldering, and other secondary operations. A wide variety of mesh patterns can be produced in various metals, in sizes from 40 to 400 mesh, it is stated.

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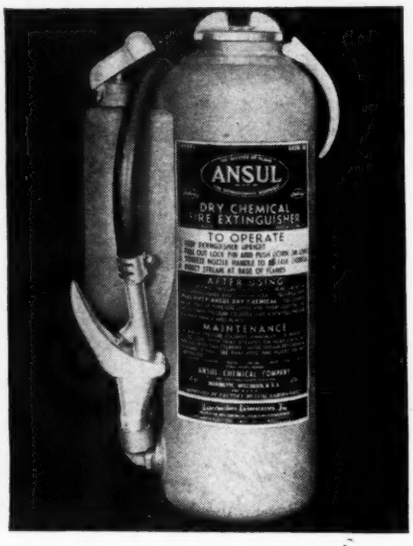
Fire Extinguisher

Greatly increased fire-stopping power is said to be one of the many advantages of the new Ansul-Dugas dry-chemical fire extinguisher recently announced by the Fire Extinguisher Division of Ansul Chemical Co., Marinette, Wis. Other important features include simplified and fast operation, simple on-the-spot recharge, improved heat-shielding protection for the operator, expert extinguishing by inexperienced operators and greater capacity without increased weight, according to the manufacturer.



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Shovel Combination

A new 1½-cu-yd. shovel, crane and dragline, Type 604, has been announced by the Shovel and Crane Division, Lima Locomotive Works, Inc., Lima, Ohio. An extra margin of strength and safety has been built into the entire machine, according to the manufacturer. The boom is of box-type electrically welded steel construction with wide flaring base. The dipper handle is a single unit with one-piece racking, and the unit is equipped with an independent chain crowd.

When the machine is working as a crane it has a capacity of 30 tons at 12-ft. radius. Dragline capacities are variable depending upon boom length and nature of work. To assure a smooth, easy operating machine for the operator and to afford the most exacting control, the Type 604 is equipped with "Precision" air control on all major functions, including steering, swinging and propelling, hoisting, crowding and retracting, boom hoist, dipper trip, shift from swing to propel and swing brake, according to the manufacturer. The power plant consists of either a diesel engine or electric motor of approved make. When not working as a shovel the Type 604 can easily be converted.

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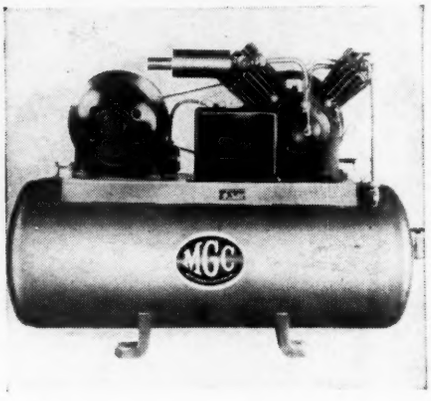
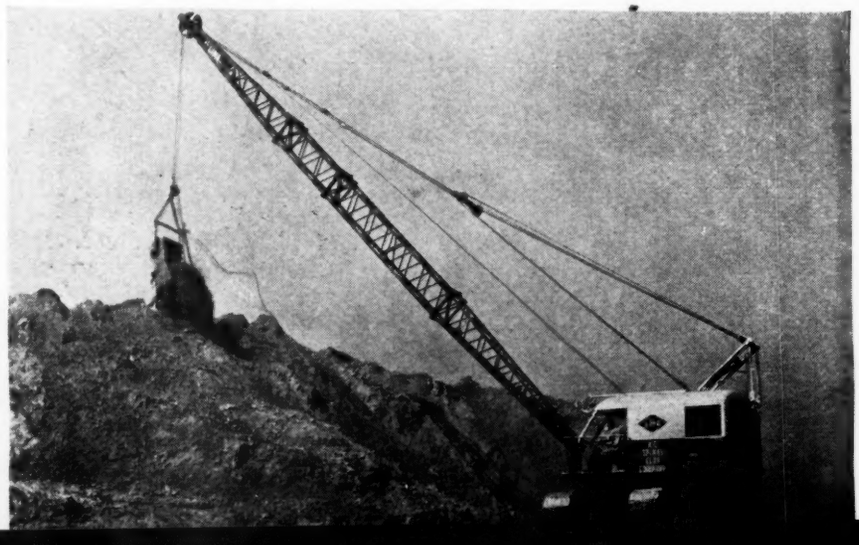
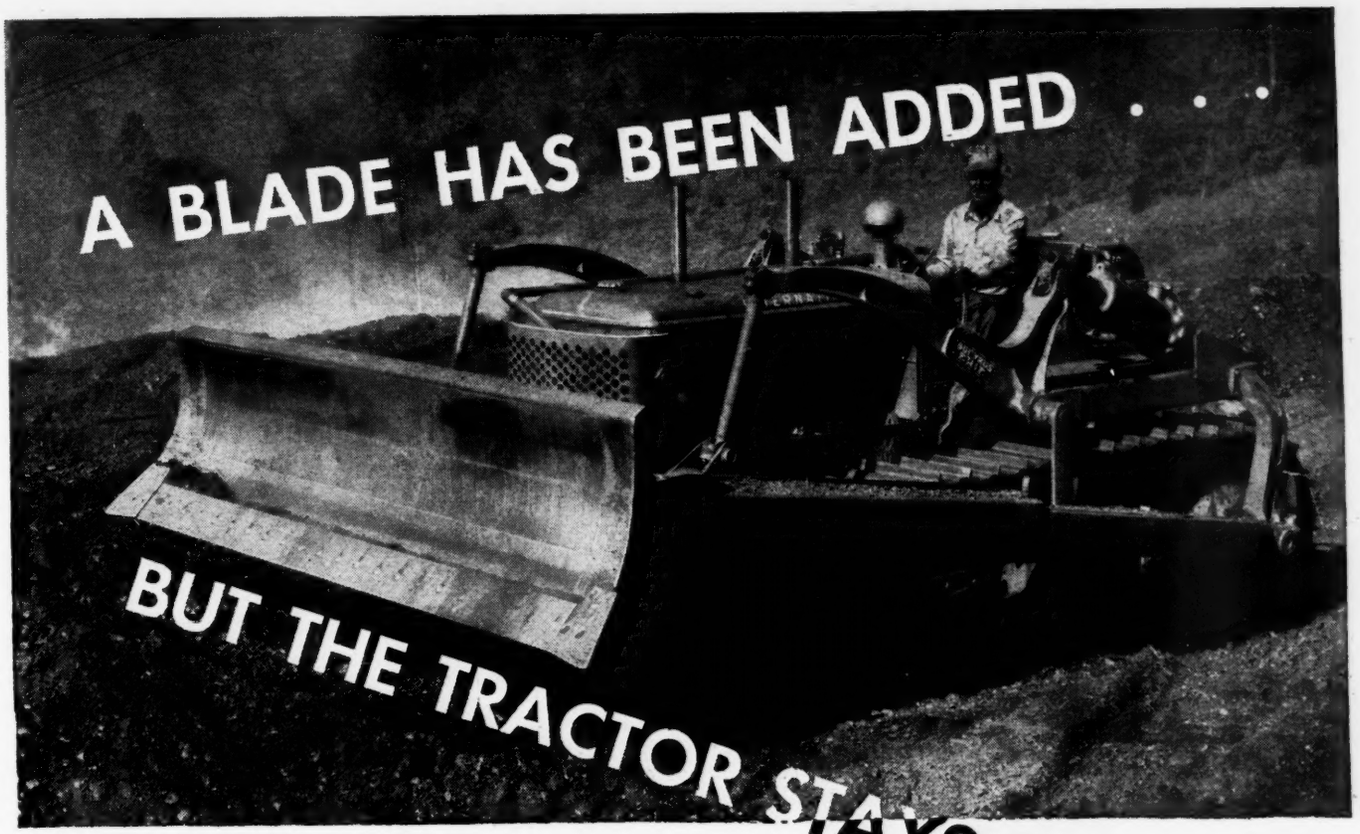
Air Compressors

Five new models of Super-Duty two-stage air compressors are being produced by the Motor Generator Corp., a division of The Hobart Bros. Co., Troy, Ohio. They will be available in 7-, 9-, 13- and 21-cu.ft. capacities and are furnished with 80-gal. storage tanks, with a 60-gal. tank optional on the 7-cu.ft. unit.



Of the self-contained type with motor and compressor mounted on a one-piece steel and sub-base, which in turn is electrically welded to an 80-gal. horizontal air receiver, the units are fully automatic and controlled by centrifugal-type unloading valves which guarantee against motor burnout, according to the manufacturer. Power transmission is direct from the heavy-duty motor by multiple V-belts with slack take-up provided.





When a Bucyrus-Erie Bullgrader is mounted on an International TracTracTor, the all-important center of gravity does not change appreciably. There is no radical "balance-upset" to cause loss of power, excessive wear, or loss of the efficiency originally built into the tractor. Weight is properly distributed to give you full advantage of tractor power. Maintenance is low because digging loads are applied at the places designed to take them. All the speed, stability, and maneuverability of the bare tractor are still yours .... No wonder a Bucyrus-Erie Bullgrader in action is a picture of smooth efficiency. The operator can handle it easily without nosing down, gouging, jerking, or stalling. It digs its blade in and sweeps through the cut with the fast action that turns out accurate grades and record outputs. Drive is smooth, easy on the tractor. The whole length of the

tracks bears on the ground at all times for full tractive effort. Maximum power is concentrated at the blade . . . Performance like that will economically solve plenty of dirt-moving problems for you. That's why it will pay you to get complete information on Bucyrus-Erie Bullgraders from your International TracTracTor Distributor.

11T45

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Industrial Notes

Colorado Fuel & Iron Corp. has elected A. F. Franz vice president in charge of operations, succeeding Robert T. Dunlap, resigned. Mr. Franz was appointed works manager of the Colorado division last March.

Kennametal Inc., Latrobe, Pa. has appointed as sales representatives Frank R. Klesyk, Blairsville, Pa., to cover an area in West Virginia comprising 31 counties, and D. L. Tunsberg, Princeton, W. Va., who will cover four counties in West Virginia, eight in Virginia and 14 in Kentucky. Two new sales representatives appointed for Pennsylvania territories are James J. McNally, Johnston, Pa., and Harry Northover, Washington, Pa. John E. Noel, Benton, Ill., has been named as sales representative in the northern half of Illinois. Harry McKee, Central City, Ky., will cover the State of Indiana; and M. C. Haley, Madisonville, Ky., will cover all Kentucky counties except those in the southeast section of the State.

Standard Oil Co. (New Jersey), New York, N. Y. has named as vice president Chester F. Smith, a director of the company and associated with it for more than 35 years in manufacturing and engineering operations.

Quaker Rubber Corp., Philadelphia, Pa., in an expansion of its fire-hose department, has advanced two of its present employees, Frank A. Rowe becoming district manager of Philadelphia fire-hose division, and P. H. Penman, district manager of the Cleveland fire-hose division.

Reeves Pulley Co., Columbus, Ind., has established a Philadelphia office in the Wilford Bldg., 33rd & Arch Sts., and has appointed Philip C. Talbot manager of the new branch. He will be assisted by William A. McCosh.

Four Wheel Drive Auto Co., Clintonville, Wis., has appointed A. R. Krug as zone sales manager for the States of Tennessee, Alabama, Flordia, Georgia, South Carolina and North Carolina. Wm. C. Merrill has been named zone sales manager for the States of Texas, Oklahoma, Arkansas, Louisiana and Mississippi.

Dings Magnetic Separator Co. has announced that with its recent move into a new plant in Milwaukee's southwestern industrial district it has centralized all its manufacturing activities previously carried on in two Milwaukee plants. New equipment and machine tools have been installed throughout and, according to officials, the added floor space and more efficient plant layout will make possible greatly increased production almost immediately.

Lincoln Electric Co., Cleveland, Ohio, has appointed several new welding sales engineers to its offices as follows: Marvin Anderson, Moline, Ill.; Albert Bavaria, Philadelphia; Richard Freundlich, Cleve-

land; and Paul Holden, Franklin, Pa.

Chevrolet Motor Division, General Motors Corp., has named T. C. Mallon, formerly zone truck manager at Omaha, assistant manager of its commercial and truck department.

National Malleable & Steel Castings Co. has promoted Herbert H. Smith to sales agent in its mine and industrial division, with headquarters in Cleveland. Mr. Smith, who has been a field engineer for National Malleable since 1945, joined the company's engineering department in Cleveland in 1937.

International Harvester Co. has appointed H. E. Gottberg assistant manager of manufacturing, motor truck division. Mr. Gottberg previously was manager of International Harvester's Indianapolis engine works. The company also has announced the establishment of separate motor truck branches at Columbus, Ohio; Fort Wayne, Ind.; Little Rock, Ark.; and Davenport, Iowa. General line branches, which handle the company's farm machinery, tractor, and refrigeration lines, will continue at those points also.

Freedom-Valvoline Oil Co., Freedom, Pa., has announced appointment of C. M. "Mel" Mohr as the new manager of the company's Freedom division, serving those sections of Pennsylvania, Ohio and West Virginia known as the Tri-State area.

Bethlehem Steel Co., Bethlehem, Pa., has appointed Arthur F. Peterson, formerly manager of the Cornwall ore division, general manager, raw materials properties.

Drott Mfg. Corp., Milwaukee, has completed new, modern office and manufacturing buildings at 4344 North Green Bay Ave. Expansion from Midwest to national distribution in recent years and addition of new products to its line created a need for greater production facilities, according to company officials.

Goodyear Tire & Rubber Export Co., Akron, Ohio, has named Ivan C. Alspach manager of mechanical goods. Since 1944 he has been the company's mechanical-goods representative for the Atlantic seaboard, with headquarters in New York.

Johns-Manville Sales Corp., New York, has elected Francis J. Wakem, associated with company since 1921, a vice president. Mr. Wakem also will continue as merchandise manager of the Industrial Products division.

Rockbestos Products Corp., New Haven Conn., recently completed the addition of more than 11,0000 sq. ft. to its operating facilities in preparation for the increased demand expected for its products. Immediately following V-J Day the company, according to officials, began to put into effect plans for changes in the physical layout of its factory and offices. These improvements, including the sectional laying of a concrete floor for the entire factory and the erection of a two-story structure, were of necessity carried out step by step

because of the need to keep production units operating at full capacity to keep pace with current heavy demands.

Independent Pneumatic Tool Co., Chicago, has announced a $1,000,000 expansion of its main works at Aurora, Ill., which will provide 85,000 sq.ft. of additional floor space for production purposes. The site for the expansion has been cleared adjacent to the company's main plant and construction is expected to begin shortly.

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Trade Literature

AVAILABLE WITHOUT CHARGE ON REQUEST TO THE MANUFACTURER

Electric Motor—Link-Belt Co., 307 North Michigan Ave., Chicago 1. Bulletin No. 2085 provides detailed information on the construction, application and performance of the new Link-Belt Electrofluid Drive motor recently announced.

Floor Resurfacer—Stonhard Co., 401 North Broad St., Philadelphia 8. Folder describes use of Stonhard heavy duty Resurfacer in the repair and resurfacing of concrete and wood floors, traffic aisles and platforms.

Tractor—Caterpillar Tractor Co., Peoria 8, Ill. Booklet No. 9358 describes the Model DW10 tractor, a rubber-tired machine designed and built for heavy, off-road earthmoving operations. Action pictures, model views of the unit and its heavy duty 100-hp. diesel engine, and brief specifications are included.

Light and Power Units—Davey Compressor Co., Kent, Ohio. Bulletin describes four new Da-V-Lite portable lighting and power units and contains complete specifications of the Floodlight, Searchlight, Combination and Beacon models, which, in addition to their lighting uses, can be employed to supplement existing power facilities or provide motive power for electric tools.

Motor-Maintenance Tools—Holub Industries, Inc., Sycamore, Ill. Catalog lists the Holub line of motor-repair equipment, such as commutator and slip-ring resurfacing stones, polishing stones, commutator saws and milling cutters, carbon brush seaters, blowers and vacuum cleaners, varnish insulation sprayer, voltage and circuit testers, wire-insulation strippers, live centers for lathe turning of armatures, fuse reducers, etc.

Tractor—Caterpillar Tractor Co., Peoria 8, Ill. Catalog No. 9151 illustrates and describes features, construction and application of the Caterpillar diesel D7 tractor.

Welding and Cutting—Air Reduction Sales Co., 60 East 42nd St., New York 17. General welding- and cutting-products

catalog profusely illustrated and divided into two sections: oxyacetylene welding and cutting gases, equipment and supplies; and arc-welding machines, accessories and electrodes. Especially compiled electrode price lists are included.

Motor Generators—Electric Products Co., 1725 Clarkstone Rd., Cleveland 12, Ohio. Folder No. B-208 lists the company's line of high-current, low-voltage motor generators and other special electrical equipment.

Earthmoving—R. G. LeTourneau, Inc., Peoria, Ill. Folder No. TP-126 illustrates a wide range of Tournapull applications with action photographs and on-the-job descriptions.

Welders—Westinghouse Electric Corp., Pittsburgh 30, Pa. Booklet No. B-3548 covers construction details, electrical specifications and application data on its complete line of a.c. transformer-type welders and furnishes detailed information on the 500- and 400-amp. industrial welders for fast, steady production; the 300-amp. welder for heavier-than-average work; and the general-duty welders ranging from 20- to 250-amp.

Fire Hose—B. F. Goodrich Co., Akron, Ohio. Folder, "Firemen Can Work Faster with B. F. Goodrich Hose," describes the properties and features of the Goodrich line.

Conveyor Belting—Hewitt Rubber, 240 Kensington Ave., Buffalo 5, N. Y. Folder describing the company's general line of coal-conveyor belting includes the Ajax Underground, recommended for heavy duty mine work and furnished in either straight or stepped-ply construction; Ajax Standard, designed for a wide range of coal-conveying operations and also furnished in straight or stepped-ply construction, and Conservo, recommended for portable coal loaders used in processing and dealer plants.

Scrapers—Caterpillar Tractor Co., Peoria 8, Ill. Folder No. 9372 details specifications and production features of the new Caterpillar scrapers, which are matched in capacity to the manufacturer's diesel-powered tractors and built to perform with them as complete earthmoving units.

Flame Cutting—Joseph T. Ryerson & Son, Inc., Chicago 80. Illustrated bulletin on flame cutting describes the company's facilities for producing plain and intricate shapes from steel plates and shows a number of typical flame-cut sections, along with information regarding the use of irregular-shaped steel plates in both production and maintenance work.

Utility Jack—Templeton, Kenly & Co., 1020 South Central Ave., Chicago 44. Folder describes the Simplex Util-A-Tool, said to straighten frames, push and pull machinery, clamp parts together for welding or assembly, lift and support tractors and other machinery, pull all sizes of wheels and perform other jobs.

Protective Eye Equipment—Mine Safety Appliances Co., Braddock, Thomas and Meade Sts., Pittsburgh 8. Bulletin No. CE-29 illustrates and describes M. S. A. eye-protection equipment for a wide variety of applications in many types of work.

Employee Awards—Award Inventives, Inc., 160 Broadway, New York. Publication, "How Industry Profits from Service Awards," outlines one of the effective techniques used to better labor-management relations. A large variety of typical emblems and devices are described and illustrated, including many for service, safety, sales, production, recreation and suggestion campaigns.

Trucks—Four Wheel Drive Auto Co., Clintonville, Wis. Bulletin No. 462 illustrates the U series 5-ton FWD heavy duty service trucks and discusses their application and the construction and operation of the motor, chassis and other parts.

Eye-Safety Equipment—American Optical Co., Southbridge, Mass. Eye safety guide lists 17 industrial eye-hazardous operations in 17 industries and recommends the proper protection equipment. It is arranged so that the proper choice can be made in a few seconds.

Earthmover—Euclid Road Machinery Co., Cleveland 17, Ohio. Folder No. 401 features the improved Euclid loader for high-speed loading of large haulage equipment in stripping, road and other construction work. Operation, construction and specifications are thoroughly covered.

Magnetic Brakes—Stearns Magnetic Mfg. Co., Milwaukee 4, Wis. Catalog No. 6604-D covers magnetic brakes for floor, motor and machine mounting and contains complete data, specifications, forms for mounting of brakes and general application information.

Power Transmission and Conveyors—Patron Transmission Co., 120 Grand St., New York. Catalog lists many nationally known lines of speed reducers, gears, belts, chain drives, bearings, flexible couplings, pulleys, electrical motors, power and gravity conveyors, etc., and furnishes complete descriptions, data and prices.

Diesel Electric Units—Caterpillar Tractor Co., Peoria 8, Ill. Booklet No. 9489 describes and illustrates Caterpillar diesel electric sets for supplying power for mines, isolated communities and industrial operations.

Pipe Fittings—Bonney Forge & Tool Works, Allentown, Pa. Catalog includes complete application information, structural data, installation procedure, temperature-pressure rating charts, specifications and list prices of fittings for making full pipe-strength, permanent, leakproof branch-pipe outlets and also illustrates and describes drain-out fittings and the complete line of flanges.

Generators—Ready-Power Co., 11231 Freud Ave., Detroit 14. Bulletin No. 231-2 illustrates and describes the features and construction of the Ready-Power gasoline-, gas- or diesel-powered engine generators and includes specifications and ratings.

Diesel Engines—Caterpillar Tractor Co., Peoria 8, Ill. Booklet No. 9732 stresses the features required in an industrial engine to cope with rugged and exacting operations and spotlights various typical applications.

Degreasers—Mechanical Process Co., South Orange, N. J. Bulletin contains specifications, construction and operating details of various models of the D'Oiler degreasers for cleaning metal parts and pieces.

Power Generation—Allis-Chalmers Mfg. Co., Milwaukee, Wis. Bulletin No. 25B6150 describes and illustrates the Allis-Chalmers steam turbines, turbo-generators, hydraulic turbine-generators, engine-type generators, condensers, pumps, motors and controls, switchgear and circuit breakers, transformers and unit substations.

Pumps—Nagle Bros., Chicago Heights, Ill. Catalog contains detailed descriptions of the Nagle line of centrifugal pumps especially designed for handling abrasive and corrosive mixtures and liquids. Full data on specifications, sizes, capacities, weights, etc., are included for the various types.

Heat-treated gears are used in this transmission and spur gear reductions, with an ample factor of safety for the operation of machine under all conditions. Link-Belt bearings of extra size are used throughout. Augers are connected to main-drive shaft through a self-aligning chuck of ample size, in which is secured the drive shaft by two shear pins which provide sufficient safety to rest of machine. The machine is raised or lowered to a height of 36 inches by jacks on front of machine, and rear of machine is mounted on two pneumatic-tired wheels which also have a 36-inch range of adjustments. The machine permits the drilling of a controlled-angle hole, which makes possible a great saving in the use of explosives through the cantilever effect of this controlled-angle drilled hole.

Parmanco

MECHANICAL FEED HORIZONTAL DRILL.

TRACTION EQUIPPED

PARIS MANUFACTURING COMPANY
PARIS, ILLINOIS

PUMPS "by Aurora" FOR PLUS VALUES

in PERFORMANCE • LONG LIFE • ECONOMY

Pumps "by Aurora" are well worth knowing — efficient and lasting — sizes for practically all requirements. Built by exclusive makers of fine pumps who regard EVERY pumping job IMPORTANT. Pumps "by Aurora" deliver satisfaction.

NSA Aurora Centrifugal Sump Pump

Aurora Deep Well Turbines for all conditions—4" to 24"

Type AD Hor. Split Case, Two Stage Centrifugal

Type OD Hor. Split Case Double Suction Single Stage Centrifugal

Type G M C Close-Coupled Centrifugal

Apco Turbine-Type Pumps The simplest of all pumps. Ideal for small capacity, high head duties. Silent, compact and lasting.

The ONLY MOVING PART IN the APCO

Type GGU Side Suction Single Stage Centrifugal

APCO Horizontal Condensation Return Unit

APCO Single Stage Turbine-Type

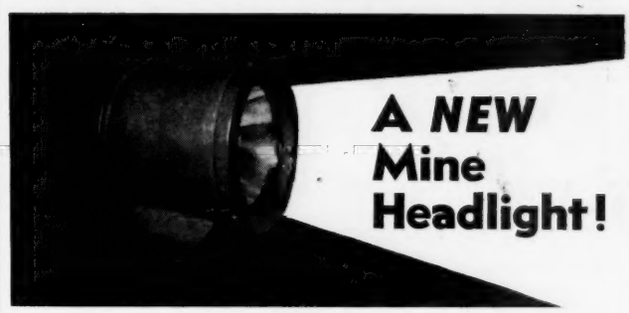
Write for **CONDENSED CATALOG M** or See Our Catalog in SWEETS.

DISTRIBUTORS IN PRINCIPAL CITIES

AURORA Always PUMPS

AURORA PUMP COMPANY

92 Loucks Street, AURORA, ILLINOIS



"FLOOD CITY"—150-W.

Efficient Sealed-Beam headlights are now available for Mine Locomotives, Cutting and Loading Machines, in the NEW, modern, "FLOOD CITY" — 150-W Projector.

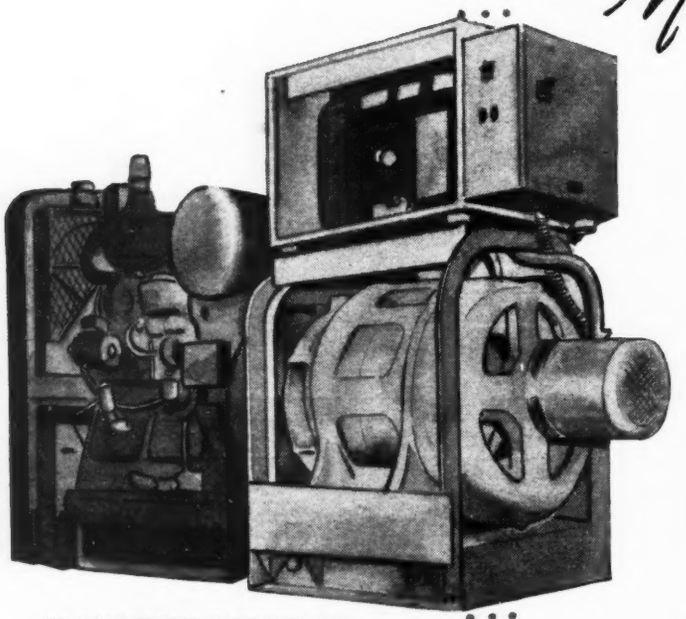
Light is constant throughout the life of the lamp. Ruggedly built and guarded against breakage. Attractively priced. WRITE.

Flood City Brass & Electric Co.

Messenger & Elder Sts., Johnstown, Pa.

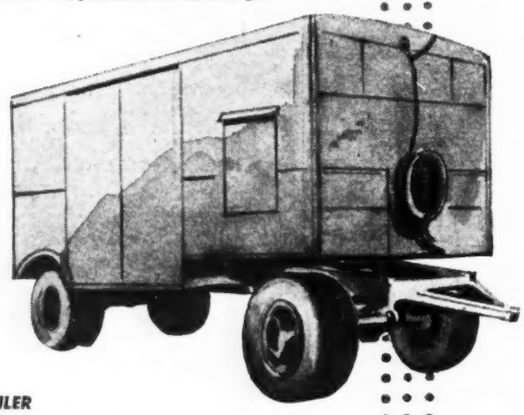
Branch Office: **4 Virginia St. W.; Charleston, W. Va.**

25KVA Electric POWER UNITS Mobile and Portable



25 KVA PORTABLE POWER UNIT

Specifications: gasoline engine driven—AC generator—20 kw at 80% power factor—120 Volts—single phase—60 cycles—900 r.p.m.—mounted on welded steel bed plates. Dimensions: 111¾" long x 35" wide x 64⅛" high. Weight: 5000 lbs. These engines are readily adaptable to operation on natural gas.



TRAILER

Features: all-metal construction—trailer adaptable as mobile office when unit is removed.

These are big, rugged, yet economical, generators designed and built for long service. They are the perfect machines for construction jobs, gas and oil drilling companies, mining companies, logging camps, in fact for all those whose lighting requirements are above the average and where consistent performance is an absolute necessity. Small motors can also be used.

For specific information on any machine, write, phone or visit the War Assets Administration Regional Office in Baltimore, Cincinnati, or San Francisco. (Trailers located in Baltimore only.).

NEW LOW PRICES

Savings as high as $1500 and more.

Portable Units now $1490 or less, depending on condition.

Trailer Units now $2140 or less, depending on condition.

While some of the power units are used, all are usable without material repairs. All trailers are used.

Although this material has previously been offered to priority claimants, 10% of the merchandise has been reserved to fulfill any further needs of priority claimants including VETERANS OF WORLD WAR II, who are invited to contact the Regional Office serving their area.

This equipment is available for export. Any question on export control should be referred to Office of International Trade, Department of Commerce, Washington, D. C.

WAR ASSETS ADMINISTRATION

GOVERNMENT OWNED SURPLUS

Offices located at: Atlanta · Birmingham · Boston · Charlotte · Chicago Cincinnati · Cleveland · Dallas Denver · Detroit · Fort Douglas, Utah Fort Worth · Helena · Houston · Jacksonville · Kansas City, Mo. · Little Rock Los Angeles · Louisville · Minneapolis Nashville · New Orleans · New York Omaha · Philadelphia · Portland, Ore. Richmond · St. Louis · San Antonio San Francisco · Seattle · Spokane Tulsa

824-1

POSITIONS WANTED

CHIEF ELECTRICIAN — Exceptionally fine background in heavy industries and strip mines for the past 15 years desires connection with progressive strip operator. Has handled large operations and latest electrical equipment. Can handle work safely and keep costs down. 2 years university. PW-386, Coal Age, 520 N. Michigan Ave., Chicago 11, Ill.

MASTER MECHANIC or Chief Electrician—25 years practical experience, all types of mining equipment, machine shop and power plant. Technical training good references. PW-387, Coal Age, 330 W. 42nd St., New York 18, N. Y.

BUSINESS OPPORTUNITIES

FOR SALE: Western Pennsylvania 900 acres of land approximately 500,000 tons of coal (possible to buy adjoining acreage of coal). Mine opened and railroad siding available—also oil and gas lease $25,000. Write BO-372, Coal Age, 330 W. 42nd St., New York 18, N. Y.

10,000 ACRES coal land Eastern Kentucky; 3 seams excellent coal. Located on L. & N. Railroad. E. M. Huffman, Box 563, Huntington, West Va.

QUALIFIED OPERATING Organization seeking coal company needing revitalization regarding increased output and lower operating costs or introduction of complete or partial mechanization program. Organization has many years background in all phases coal mining ventures including installation new properties. Capable and desirous of taking over complete charge operations excluding sales. Address reply to BO-388, Coal Age, 520 N. Michigan Ave., Chicago 11, Ill.

125 ACRES COAL property Buildings, tipple, cars rails in place no machinery. Smokeless, sootless 2½ ash. coal fines stoker. Fronts on more acreage. Box 207, Central City, Ky.

SEARCHLIGHT SECTION

(Classified Advertising)

EMPLOYMENT: "OPPORTUNITIES" : EQUIPMENT
BUSINESS: : USED OR RESALE

UNDISPLAYED —RATES— DISPLAYED

90¢ a Line, minimum 4 lines. To figure advance payment count 6 average words as a line.

Positions Wanted (full or part time salaried employment only ½ the above rates payable in advance.

Box Numbers—Care of publication New York, Chicago or San Francisco offices count as 10 words.

Discount of 10% if full payment is made in advance for 4 consecutive insertions.

Individual Spaces with border rules for prominent display of advertisements.

The advertising rate is $6.30 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.

An advertising inch is measured ⅞" vertically on one column, 3 columns—30 inches—to a page.

NEW ADVERTISEMENTS received by January 31st will appear in the February issue, subject to limitations of space available.

PNEUMATIC JACKHAMMERS
19—INGERSOLL RAND X59 .....$185.00 ea.
5—CHICAGO PNEUMATIC CP-10...$165.00 ea.
16—CHICAGO PNEUMATIC RIVETING HAMMERS NO. 60, 1 1/16"x 6 ..... $45.00 ea.
Misc. Supply Division
PHILADELPHIA TRANSFORMER CO.
BOX 566 TEL. 165 DALTON, PENNA.
Plants: Phila. and Dalton

WANTED

WANTED
¾ to 4 yard Shovels
2 to 8 yard Draglines
FRANK SWABB EQUIPMENT CO., Inc.
HAZLETON, PA.
Telephones: 4910J and 4911

We own and offer for sale
Good Used Navy
ANCHOR CHAIN
1" UP TO 3¼"
IMMEDIATE SHIPMENT
FROM NEW YORK WAREHOUSE
P. W. BOWERS & CO. INC.
67 Park Avenue New York 16, N. Y.
Phone, Lexington 2-7246

OPPORTUNITY!
We are a reputable principal READY to **PAY YOU CASH**
For quick purchase on INDUSTRIAL PLANTS—MFG. DIVS or UNITS (assets or capital stock)
FOR IMMEDIATE ACTION IN THE STRICTEST CONFIDENCE
Address: Box No. 1217
147 W. 42nd St., New York 18, N. Y.
Personnel will be retained wherever possible.

Air Compressors Wanted
Horizontal Water Cooled—100 CFM or larger; also
Gasoline or Diesel Driven Portable Machines
L. W. BAUER
North Bergen, N. J.

D. C. LIFTS, 34 H. P.
3000 LBS. AT 600 FT./MINUTE
OTIS GEARLESS TRACTION
220 volts, 135 amps., 63.5 r.p.m., 6-5/8" cables. IMMEDIATE DELIVERY. MANY OTHER A.C. & D.C. MACHINES. Several hundred Iron and Steel Sheaves and Castings of varied types. Clips and Sockets for Wire Rope. 6 pcs. 118' ea. 7/8" 6x37 Improved Plow Steel Cable.
Utility Elevator Service, Inc.
34 Jumel Place, New York 32, N. Y.

WANTED
HAULING CONTRACT
Large Highway, and off the highway Dump Trucks Available Immediately.
G. N. BROWN
1435 Dormont Ave. PGH (16), Pa.

WANTED
BY COAL STRIPPER
Loading shovels 1½ to 2 yards, stripping shovels 2 yards and larger preferably with oversized boom, dragline combinations 3 or 3½ yards, minimum boom length 80 feet.
Box CA 1498,
113 W. 42nd N. Y. C.

Three 7 BU Joy loading Machines in good condition.
Four 112 AB Goodman Shortwall Mining Machines, mounted on track trucks, in good condition.
These machines are located at our Victoory Mine near Terre Haute, Indiana.
PYRAMID COAL CORPORATION
P. O. BOX 1140
TERRE HAUTE, IND.

COAL LANDS
Suitable for strip mining. Complete details upon request.
G. B. LORRAINE
Law Building, Richmond 19, Va.

WANTED
40–50 MINE CARS
in fair condition, end dump, 30" gauge, 12 or 14 wheel, 1½ or 2 ton. Please state price and location for inspection.
Frederick & McCormick Coal Co.
Chicora, Pa.

NEW INTERNATIONAL TRACTORS
Model C-11, KR11 motor, Air brakes, Fifth wheel, Cab Over Engine, 121" W.B., Double reducion rear axle. Immediate delivery. Perfect for every type of hauling.
Guaranty Equipment Company
918 N. Eleventh St. St. Louis 1, Mo.
Chestnut 9697

FOR SALE
TURBO GENERATORS
2—300 KW Allis Chalmers TURBO GENERATOR SETS, bleeding, 3 phase, 60 cycle, 440 volt; complete with Switchboard and all accessories.
NATIONAL WOOLEN COMPANY
90 West Broadway, New York City
Tele: WOrth 2-1845

WANT TO TRADE
For 26" or 30" belt conveyor
4—Jeffrey 61-AM Conveyors—1200' pan
1—Jeffrey 61-W Conveyor 300' pan
1—Jeffrey 61-EW Conveyor
2—Jeffrey 61-HG Conveyors 60' pan
Good Condition—Now Operating
Brownfield Coal Co.
63 S. High St., Columbus, Ohio

WE specialize in buying complete mines that are going out of business or from receivers in bankruptcy, Administrators of estates, etc.

Frank J. Wolfe

COAL MINE EQUIPMENT SALES COMPANY

306-7 BEASLEY BUILDING — L. D. Phone-34 — TERRE HAUTE, INDIANA

CUTTING MACHINES

1—12-AA Goodman with or without truck
1—12-AB Goodman with or without truck
1—CE-7 Sullivan with or without truck

LOCOMOTIVES

1—904-C Westinghouse, 250 volt 42 or 44 gage
1—G.E. 809, 250 volt, 40" gage

SUBSTATIONS

1—100-KW G.E. M-G set complete, 275 volt D.C. 2300 A.C.
1—150-KW Ridgeway M-G set complete, 275 volt D.C. 2300 A.C.
1—Extra armature and extra stator for 150-KW Ridgeway

MISCELLANEOUS

1—35-HP. Cargo winch complete with 230 volt D.C. Motor
1—100-HP. Reeves Natural gas engine with 62.5 KVA G.E. alternator, 220 volt with complete switchboard equipment
1—100-HP. Buda Diesel Engine, 1850 RPM.
1—400-Amp. Lincoln welding machine with D.C. drive 230 volt
1—5 x 8' Fairmont vibrating screen
2—500 volt Goodman 212-AA cutting machine armatures
1—250 volt Goodman 212-AA cutting machine armatures
1—30-C Goodman Locomotive armature
1—30-B Goodman Locomotive armature

A.C. & D.C. Stationary Motors, Starters, Transformers and Miscellaneous mine supplies.

We solicit your inquiries

ALL-STATE EQUIPMENT CO.

LOGAN, W. VA. — Phone 884

MINING MACHINES

AC or DC
REBUILT & GUARANTEED
FOR IMMEDIATE SHIPMENT

COAL CRUSHERS
Single & double roll.

Electric Coal Drills, Mine Fans, Vibrating Screens, Electric Generators, Motors, etc.

CONVEYORS — Belt and Drag. Also gravity conveyors, bucket elevators, etc.

The INDUSTRIAL EQUIPMENT Corp.
(Established 1902)
705 First National Bank Bldg.,
PITTSBURGH 22, PA.
Warehouse: Carnegie, Pa.

DRAGLINE OR CRANE: Lima model 1201 with 80' boom Cummins diesel motor with long cats, with threads 42" wide, with 3 yd. and 3½ yd. dragline buckets, Koehler light plant; guaranteed condition.

NEW CONVEYOR BELT: Large quantity 42" and 60" Conveyor Belt, 6 and 7 ply 7/16" top cover, 1/16" bottom cover, 42 oz. duck. All new. Pure rubber.

VIBRATOR FEEDER: Jeffrey Traylor 6' x 6' open pan deck, powered by four No. 5 heavy M-4 motors, including motor generator equipment for 440 volt, 3 phase, 60 cycle, operation; capacity 1500 tons of earth and stone per hour, maximum size stone 3' cubes.

LOCOMOTIVE: Steam, Lima 80 ton, 6 wheel, Switcher with tender; thoroughly modern, excellent condition. Sale or rent.

SCREENS: 2—Allis Chalmers extra heavy, single deck, 5' x 14' with 10 H.P. motors, 440 volt, V-belt. Kennedy 4 x 8, 4 deck; 3 x 8, 3 deck. Telsmith 3 x 8, single deck. Jeffrey 48" x 78", single deck. Robins 4 x 6, 3 deck, with motor.

A. J. O'NEILL
Lansdowne Theatre Building
LANSDOWNE, PA.
Phila. Phone: Madison 8300 - 8301

AIR COMPRESSORS:
12—Belted 360, 676, 870, 1000, 1300 ft.
12—Diesel 105, 315, 520, 676 & 1000 ft.
6—Electric 1300, 1500, 2200, 5000 ft.

CARS & LOCOMOTIVES:
100—50 ton cap. Gondolas
35—50 ton cap. Flat Cars
4—35 & 65 ton Diesel Locomotives
6—10, 16, 20 & 30 ton Gas Locomotives
150—8000 & 10000 gal. cap. Tank Cars
20—12 yd. Std. ga. Steel Dump Cars

RUBBER CONVEYOR BELTS:
1000', 60", 600', 30", 300', 20", 1000', 42", 900', 48", 1450', 36", 1200', 24", 900', 18", 600', 16", 350', 14".

ELECTRIC LOCOMOTIVES:
15—3, 5, 8 ton Battery & Trolley.

DIESEL GENERATORS:
12—100, 150, 180 & 480 KW.

MINE LOADERS:
17—GD9, Eimco 21, Conway 20, 50, 60 & 75 and Sullivan HL3.

STEEL TANKS:
30—8000, 10,000 & 20,000 gallon capacity.

SHOVELS—DRAGLINES:
7—1 yd., 1½ and 2 yd. Gas & Diesels.
16 yd. Elec. 160 ft. Boom Dragline.

R. C. STANHOPE, INC.
60 E. 42nd Street — New York 17, N. Y.

ROTARY CONVERTER

200 Kw, 600 volts DC, 1200 rpm, compound wound, interpole, pedestal type HCC General Electric 6 phase, 60 cycle, synchronous rotary converter; equipped with speed limit switch, equalizing switch, field flashing switch and oscillating device. Specialists in the furnishing of electrical requirements of the Coal Industry for more than 25 years.

Send us a list of your surplus electrical equipment and your present requirements.

R. H. BENNEY EQUIPMENT CO.
5024 Montgomery Road Norwood 12, Ohio
Better Known—Known to be Better

FOR SALE

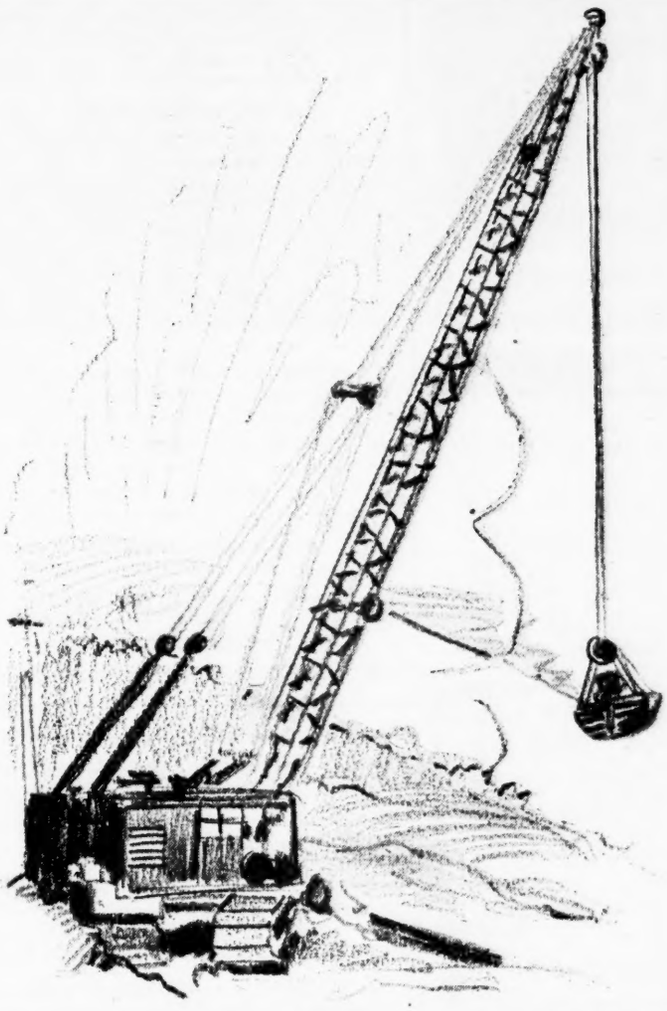
6—Pit car loaders
1—Myers-Whaley #3 & #4 Automat Loading Machines.
1—12 ton diesel locomotive.
1—Deep Well Turbine Water Pump, 550 gallons, 50' head, 220 volt, 3 phase.

GUYAN MACHINERY COMPANY
Logan, West Virginia

FOR SALE
COAL CRUSHER
AMERICAN PULVERIZER
Type A. C. Serial No. 2258
Complete with V-Belt Sheave
Excellent condition - Immediate delivery
MIDWEST-RADIANT CORPORATION
220 North Fourth St., St. Louis, 2, Missouri

Practically New
2 ALLIS-CHALMERS CRUSHERS
4"x6" Dodge Type
MAGNA MANUFACTURING CO., INC.
444 Madison Avenue New York 22, N. Y.
Tel. ELdorado 5-4136

SEARCHLIGHT SECTION



MOVE that Overburden At LOW Cost!

When the Stripping Shovels need help in moving back the overburden from the edge of pit—a high-speed crane or dragline will do the work — FAST.

For any STRIP PIT EQUIPMENT — SHOVELS, DRAGLINES, CRANES, or HAULING EQUIPMENT — Phone "Collect" to ECONOMY COMPANY. From our "Coast-to-Coast" Lists we can meet your needs. And ask about our "LEASE-BUY" PLAN, which enables you to "PAY-AS-YOU-GO."

20 yd. Marion Dragline. 200' boom Rebuilt in 1943. Condition real good. Price on request.

S-649 2 yd. Bucyrus-Erie Model 50B steam shovel. $5500. Indiana.

2¼ yd. Manitowoc Diesel 70' boom. Very good condition. West Virginia. Price on request.

3½ yd. Lime Model 1201. Cummins Diesel Engine. 80' boom. 3½ yd. dragline bucket. Built in 1942. Entirely rebuilt. Price on request.

S-651 2 yd. Marion Model 381 Diesel shovel. Manufactured 1941. Rebuilt condition. $28,500. Arizona.

One Bucyrus-Erie 54B shovel and dragline. Lanova Diesel engine. Esco Dipper Koehler light plant. West coast. Price on request.

S-653 2½ yd. Bucyrus-Erie Model 48B Diesel shovel and dragline combination. Serial #14777. 2¼ yd. Dipper bucket. Brand new 80' boom. 2½ yd. dragline bucket. Recently rebuilt. $25,200. Oregon.

One Bucyrus-Erie 52B Diesel combination. Serial No. 11,500s. Completely overhauled. $30,600. California.

2½ yd. Lima 901 dragline. 80' boom. New in 1938. Waukesha Diesel engine. Complete light plant. W. Virginia. Price on request.

2½ yd. Lorain Model 95D shovel and dragline. Cummins Diesel engine. 65' boom. New cab. $24,950. Tennessee.

3 yd. Monighan walker dragline Model 3T. 75' boom. 150 HP G.E. motor. 500' cable. Good condition. $14,500. Illinois.

3 yd. Manitowoc crane. Model 3000E. Gas operated. Built in 1938. 60' boom. 20' jib. Extensions to 110' can be added to boom. $22,500. Texas.

2¼ yd. Manitowoc dragline. 80' boom. Diesel powered. A good buy. Write for information.

S-659 3 yd. Marion 38A Diesel dragline. Serial #7168 Waukesha-Hesselman engine. 75' boom. 1940 machine. $21,000. Louisiana.

3 yd. Monighan 3T dragline, new type walkers. Serial So. in the 300s. 80' boom. Extra parts. Two good Page buckets. One extra motor for spare parts. Indiana. Price on request.

2 yd. Marion Shovel—entirely rebuilt and guaranteed. Shipped from factory in 1941. Price .... $28,500.

S-661 3½ yd. Lima 1201, Cummins Diesel, dragline, 80' boom. Koehler light plant. 3½ yd. buckets. New in 1942. Completely overhauled. $48,000. Kentucky.

4 yd. P&H model 900 dragline with Atlas Diesel motor. 80' boom. $25,750. Pennsylvania.

5 yd. Bucyrus-Erie Model 120B shovel. Full electric power. Rebuilt & guaranteed. Location and price on request.

7 yd. Marion Model 350 electric shovel. 80' boom and 52' stick. Rail-truck mounting. Ward Leonard power plant complete with a quantity of new and used parts. Price on request.

20 yd. Marion Model 5600 dragline. Electric powered AC current. 200' boom. $75,000. New parts. 20 yd. brand new dragline bucket, ready for immediate shipment. Price on request.

7 yd. Marion Model 350. Shovel boom 80'. Dipper stick 52'. 7 yd. dipper bucket. Price good. Phone or write for information.

ECONOMY COMPANY, INC.

49 Vanderbilt Ave., New York, N. Y. **Tels. MUrray Hill 4-2294-8292-2295-2296**

FOR
IMMEDIATE DELIVERY
OF
RUBBER PRODUCTS

Conveyor Belting...Transmission Belting...Elevator Belting...Fire, Water, Air, Steam, Suction or Welding Hose, etc.

CALL, WIRE or WRITE
CARLYLE
THE RUBBER HEADQUARTERS

CARLYLE RUBBER PRODUCTS ARE NEW, GUARANTEED & LOW PRICED

CONVEYOR BELTING

ABRASIVE RESISTANT COVERS

Width	Ply	Top-Bottom	Covers
48"	8	1/8"	1/16"
42"	5	1/8"	1/16"
36"	6	1/8"	1/16"
30"	6	1/8"	1/16"
30"	5	1/8"	1/16"
24"	5	1/8"	1/32"
24"	4	1/8"	1/32"
20"	5	1/8"	1/32"
20"	4	1/8"	1/32"
18"	4	1/8"	1/32"
16"	4	1/8"	1/32"
14"	4	1/16"	1/32"
12"	4	1/16"	1/32"

Inquire For Prices - Mention Size and Lengths

TRANSMISSION BELTING

HEAVY-DUTY FRICTION SURFACE

Width	Ply	Width	Ply	Width	Ply
18"	6	10"	6	6"	5
16"	6	10"	5	5"	5
14"	6	8"	6	4"	5
12"	6	8"	5	4"	4
12"	5	6"	6	3"	4

Inquire For Prices - Mention Size and Lengths

ENDLESS "V" BELTS

"A" WIDTH All Sizes | "D" WIDTH All Sizes
"B" WIDTH All Sizes | "E" WIDTH All Sizes
"C" WIDTH All Sizes | Sold in Matched Sets

Inquire For Prices - Mention Size and Lengths

PROTECT THAT PLANT
FIRE HOSE

APPROVED SPECIFICATION HOSE
EACH LENGTH WITH COUPLINGS ATTACHED

Size	Length	Per Length
2½"	50 feet	$28.00
	25 "	16.00
2"	50 "	23.00
	25 "	13.00
1½"	50 "	20.00
	25 "	11.00

Specify Thread On Couplings

SPECIAL OFFER . . . HEAVY DUTY
RUBBER HOSE

WATER HOSE
Each Length with Couplings Attached

I.D. Size	Length	per Length
¾"	25 feet	$4.25
1"	50 "	8.00
	25 "	6.25
1¼"	50 "	12.00
	25 "	7.50
	35 "	10.50
	40 "	12.00
1½"	50 "	15.00
	25 "	10.00
	35 "	14.00
	50 "	20.00

AIR HOSE

I.D. Size	Length	per Length	Couplings
½"	25 feet	$5.00	$1.50 Pair
	50 "	10.00	1.50 "
¾"	25 "	6.25	2.50 "
	50 "	12.50	2.50 "
1"	25 "	10.00	3.50 "
	50 "	20.00	3.50 "

LARGER SIZES ALSO AVAILABLE
All Prices—Net—F.O.B. New York

CARLYLE RUBBER CO., INC.
62-66 PARK PLACE — NEW YORK, N. Y.

ROTARY CONVERTERS

500 KW G.E. SYN., 275 V., 6 Ph., 60 Cy., 1200 RPM, Pedestal Type, 2300/4000 V. Transformers.

300 KW G.E. SYN. 575 V., 6 Ph., 60 Cy., 1200 RPM, Pedestal Type, 2300/4000 V. Transformers.

MOTOR GENERATORS

150 KW G.E. SYN., 275 V., 2300 V., 3 Ph., 60 Cy., 900 RPM, Manual Switchgear.

150 KW G.E. SYN., 600 V., 2300/4000 V., 3 Ph., 60 Cy., 1200 RPM, Manual Switchgear.

LOCOMOTIVES

13-T WESTGHSE., 250 V., 908-C Mts., 36"-44" Ga.
13-T Gen. Elec., 500 V., 827 Mts., 36"-42" Ga.
13-T Gen. Elec., 250 V., 827 Mts., 36"-42" Ga.
10-T JEFFREY, 250 V., 110 Mts., 36"-48" Ga.
10-T JEFFREY, 250 V., MH-110 Mts., 44"-48" Ga.
10-T WESTGHSE., 500 V., 907-C Mts., 36"-44" Ga.
10-T WESTGHSE., 250 V., 907-C Mts., 36"-44" Ga.
8-T WESTGHSE., 500 V., 907-C Mts., 42"-48" Ga.
8-T WESTGHSE., 250 V., 906-C Mts., 42"-48" Ga.
6-T JEFFREY, 250 V., MH-89 Mts., 42"-48" Ga.
6-T WESTGHSE., 250 V., 903-C Mts., 22"-30" Ga.

Each unit listed above is owned by us and is available now for immediate purchase.

WALLACE E. KIRK COMPANY
INCORPORATED
501 Grant Building, Pittsburgh, Pa.

COAL CUTTING MACHINES

1—35B Jeffrey Shortwall 250 V. D.C.
1—35BB Jeffrey Shortwall A.C.
2—29C Jeffrey Arcwall 250 V. D.C.
1—124 EJ Goodman Slabbing 250 V. D.C.
1—36B Jeffrey Longwall 250 V. D.C.

LOCOMOTIVES

1—5 Ton Goodman with 2 Type 41 250 V. Motors
1—6 Ton Jeffrey with MH88 250 V. motors
2—13 Ton G.E. with HM 820

ELECTRIC MOTORS

1—400 HP Allis-Chalmers SC 3/60/2200/1150
1—300 HP Westinghouse Type CW 3/60/2200/600
1—185 HP Burke SC 3/60/2200/1150
1—100 HP G.E. Type I Form M 3/60/2200/600
1—75 HP G.E. Type I Form M Slipring 3/60/440/720
1—40 HP Westinghouse CS 1800 RPM
1—30 HP Westinghouse CS 900 RPM
1—30 HP Westinghouse CS 1800 RPM
1—25 HP Westinghouse CS 1200 RPM

WE HAVE OTHER MOTORS

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Converters, Motor Generator Sets, A. C. & D. C. Motors, Control Equipment and Transformers.
We build equipment to fit your requirements. Over 25 years engineering background.

C. B. LOCKE CO.
P. O. BOX 3227
TEL. 38-136
CHARLESTON W. VA.

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PLANER

36" x 36" x 10' Table 30" wide 10' long. Belt Driven from separate 7½ H.P. Motor. All complete. Good Condition. Priced very reasonably for quick sale.

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AIR COMPRESSORS—DIESELS—PUMPS

Some Steam Engines and Boilers available only slightly above the metal price

BRADFORD SUPPLY COMPANY
WAYNE, WOOD COUNTY, OHIO — Near Toledo

IRON and STEEL PIPE

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Large stocks, all sizes attractive prices

L. B. FOSTER COMPANY
P. O. Box 1647 Pittsburgh 30, Pa.

CALL MOORHEAD
In Pittsburgh
FOR REBUILT MINING EQUIPMENT

MINING MACHINES
1—35 B Jeffrey 250 v. Permissible, 7½' bar.
1—35 B Jeffrey 500 v. Permissible, 7½' bar.
12DA Goodman 50 HP 250 v. 6' Bar, rebuilt.
1—35 B Jeffrey 250 v. 36/42" Ga. 6' bar.

STORAGE BATTERY LOCOMOTIVES
2—6 Ton G.E., permissible 36/44" Ga. HM 825 BB Motors, with Edison Batteries.
4 Ton 36" Ga. Atlas 2 BB Motors.
5½ Ton Type D Ironton, 42" Ga.

Haulage & Gathering Locomotives
13 Ton Westgh. 250 v. 36" or 40" Ga.
13 Ton Westgh. Bar Steel 500 v. 40/42".
10 Ton Jeffrey MH 110, 250 v. 36/42" Ga.
6 Ton G.E. 250 v. 36/42" Ga. with gath. reel or Crab Rebuilt.
8 Ton Goodman 9104C2 Permissible Gath. 500 v. 40/44" Ga.

COAL CRUSHERS
18x24 and 18x30 New Scottdale dbl. roll.

AIR COMPRESSORS
1200 cu. ft. 100# Worthington 2 stage Belted.
490 cu. ft. 100# Worth.—100 HP Syn. Motor.
3—373 cu. ft. 100# Bury—AC Motors.
173 cu. ft. 100# Pres. Chic. Pneu. Belted.
90 cu. ft. 100# Pres. Chic. Pneu. Belted.
75 cu. ft. 100# Chg. Pneu-AC Motor.
9"x8" Sullivan Portable—motor driven.

GOODMAN SHAKER CONVEYORS
5 Goodman G 20 Shaker Conveyors with 250 v. 20 HP Permissible motors, also Goodman Duck Bills.

Rotary Con. & MG Sets (3 ph. 60 cy.)
640 KW Al. Ch. 250 v.—860 HP Syn.
500 KW West. Rotary Converter 275 v. 6 phase 1200 RPM with transformers andd switchboard.
300 KW G.E. HC 12 Rotary 275 v. 6 ph.
200 KW West. 250 v. 720 RPM—300 HP 2200 v.
150 KW Ridgway 275 v. 900 RPM dir. con. 225 HP.
50 WK G.E. 125 v.—75 HP West. 220/440.
15 KW G.E. 250 v.—25 HP G.E. 220/440.
3 10 KW Bardoo 125 v.—15 HP 220/440.

AC Generators
1250 KVA West. 2 ped. Brg. 440/3/60 1200 RPM with DC Exciter (New).

SLIP RING & SQ. CG. MOTORS

HP	Make	Speed	WDG	Type
500	G.E.	450	S.R.	MT 412
450*	G.E.	257	S.R.	MT
400*	G.E.	514	S.R.	I-M
350	G.E.	900	S.R.	I-M
300	West.	1750	S.R.	CW
300*	G.E.	585	S.R.	I-M
225	West.	585	S.R.	MW
200*	West.	700	S.R.	CW
200 (2)*	G.E.	240	S.R.	MT 412
100	West.	1750	S.R.	C-I
100	G.E.	500	S.R.	M 1-25-cy
100	F. M.	900	Syn.	ABV
75	G.E.	720	S.R.	MT 365
75	West.	870	S.C.	CS
50	West.	580	S.R.	CW 658 D
50	G.E.	900	S.R.	I-M
40	G.E.	900	S.R.	MTC
35	West.	870	S.C.	CS

* We can furnish G.E. Mag. contactor Cont. & Rest.

DC MOTORS .GENERATORS, 230/250 v.

HP	Make	Speed	WDG	Type
175	G.E.	475	ser.	MD 109
130	G.E.	550	ser.	CO 1812
100	G.E.	480	ser.	MD 108
75KW	West.	1000	cp.	S
50	Northern	600	ser.	K
40	Reliance	700	cp.	T-310
40	West.	775	cp.	SK
40KW	West.	1050	cp.	SK
40	Roth	1500		
25	West.	825	cp.	SK 113
20	West.	750		
15	West.	850	cp.t	SK 93
15	Wh.	800	sh.	CM
15 (4)	Cr. Wh.	1400/1700	sh.	CM
13	West (Enc.)	825	cp.	SK 113
10	West.	730/1460	sh.	SK 80
7½	Al. Ch.	350/1050	sh.	

HOISTS & CRANES
400 HP Vulcan conical drum Shaft Hoist driven by 400 HP G.E. slip ring 440/3/60 with rev. mag. control.
400 HP Vulcan Slope Hoist—AC Motor.
2—Fairmont Car Retarders.
10 Ton Larry Car 500/250 v. DC.
2—50/75 HP 2 drum Meade Morrison slope.
75 HP Ottumwa slope with AC Motor.
75 HP Vulcan 2 drum shaft, S.R. Motor.
40 HP Lidgerwood sgl. fr. drum geared to 40 HP G.E. slip ring 220/440 v. 3 ph. 60 cy. MTC. Rev.
30 HP Carlin double dr. fr. 13"x18"—5½" figs.
10 HP Lidgerwood Hoist—AC or DC Motor.
5 Ton Shep.-AC Traveling Crane 35'9¼" span.

MOORHEAD-REITMEYER CO., INC. **Mayflower 7900** **Pittsburgh 19, Penna.**

Serving the Coal Industry for more than a Quarter of Century

NEW and REBUILT
STORAGE BATTERY
LOCOMOTIVES
1½ to 10 Ton 13" to 56" Track Gauge
GREENSBURG MACHINE CO.
Greensburg, Penna.

This Searchlight Section
of COAL AGE

is an index of reliable sources for Used and Resale coal mining equipment now available. Consult the *Searchlight Section* in following issues for later offerings.

If you don't see what you want—ask for it. Ask the advertisers. Dealers are constantly adding to their stocks and may have acquired just what you need. Or, shall we ask them for you?

And, when you have special items to dispose of, dealers will be glad to know of it, or you can use this Searchlight Section to contact user-buyers direct, if you prefer. Send a list of your equipment and we will gladly give full space and rate information.

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COAL AGE
330 W. 42nd St., New York 18, N. Y.

FLORENCE MACHINERY & SUPPLY CO.
REBUILT COAL MINING EQUIPMENT

PIT CARS
100—1 Ton R.B. Card, 36" Ga.
74—1 Ton P.B. Card, 36" Ga.

LOADERS
1—Manierre Type Box Car Egg Loader
1—7-BU Joy Loader, 250 Volts DC

SHAKER SCREENS
1—Double Deck, Lower deck 8'x28', upper deck 36" x 40'

STEEL BINS
2—10'x20'—3/16" Steel
1—16'x24'—Sectional

GENERATORS
1—100 KVA West. Syn. Motor, 2300 Volts AC
1—96 KW, 2300 Volts AC, direct connected to a 14x17 Chuse Engine
1—25 KW Crocker-Wheeler, 250 Volts DC
1—15 KW Ft. Wayne, 480 Volts AC

HOISTS—ELECTRIC
1—200 H.P. Double Drum Elec. Hoist with Motor
1—25 H.P. H&B Electric Hoist, with Motor
1—50 H.P. Hoist, with 250 Volt DC Motor

PUMPS—PYRAMID
2—3x4½ Goulds, Fig. 1813 with 1½ H.P. Motors
1—3x4½ Goulds, Fig. 1813, with ¾ H.P. Motor
1—3x3 Deming, Fig. 809, with 3 H.P. Motor

COAL CUTTERS
3—Sullivan CE-7 A.C. Coal Cutters, with Tip-Turn Trucks, with new Bowdil Cutter Chains & Feed Chains

MISCELLANEOUS
2/0 & 4/0 Insulated Wire 20# Plate Frogs & Switches
Electric Mine Gongs
Valves & Fittings
Wheelbarrows
1—18" Drag Chain Conveyors, 7' Centers, with 1 H.P. Motor & Speed Reducer

We have a complete stock of practically everything

904 EQUITABLE BLDG. **DENVER 2, COLORADO**

Yards: Denver and Florence, Colorado

GENERATING UNITS
25 & 30 KVA, AC, single and three phase driven by Le Roi Engines, complete with switchboard $1250.00. Same in Cummins Diesels $1750.00. Also tractors, bulldozers and Power Units.

OVERTON C. EVANS
Mt. Sterling, Ky.

CATERPILLAR DIESEL
D-8 with Athey Mobil Frontend Loader, 2¾ cu. yd.—like new. Weight 27 tons. Beats reg. shovel-dragline for stripping and loading. **$10,000.**

NORTHWEST NO. 6
Cat. D-17000, 60 ft. boom 2 cu. yd. dragline bucket. 1941. Excellent condition. **$14,550.**

M. WENZEL
2136 Jefferson, Kansas City, Mo.

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TRACK ACCESSORIES

from **5** *Warehouses*

- PROMPT SHIPMENTS
- FABRICATING FACILITIES
- TRACKAGE SPECIALISTS

EVERYTHING FROM ONE SOURCE

L. B. FOSTER COMPANY
PITTSBURGH · CHICAGO · NEW YORK

100,000 Lundie Type

USED TIE PLATES

7" x 10½" 7½" x 10"
Can be repunched to fit any rail section

230 Kegs ¾" x 4⅝" Oval Neck

NEW TRACK BOLTS

Relay 80, 85, 90, 105# Rails complete with bars and bolts

MORRISON RAILWAY SUPPLY Corp.
1439 Bailey Ave., Buffalo 12, New York

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All sections of rails and good serriceable second hand cars, all gauges, also spikes, bolts, frogs, switches and ties.

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FOR SALE

DRAGLINES

2—Class 230 Steam Bucyrus-Erie Draglines; 175 ft. boom; 8½ yd. bucket; machine and tracks in first-class condition. Machines located on river near New Orleans and can be shipped by water without dismantling.

EACH $50,000.00

WALTER P. VILLERE COMPANY
1100 So. Claiborne Avenue
New Orleans 13, Louisiana

1—Ridgeway 4 valve engine direct connected to 150 KW G.E. generator, 250 Volt DC, 200 RPM.

1—Ideal piston valve engine direct connected to 75 KW G.E., 250 Volt DC, 270 RPM.

1—Ball twin cylinder valve engine direct connected to 75 KW C.W. generator, 250 Volt, 275 RPM.

All in good running order.

BOOTH COLD STORAGE CO.
1220 N. Main St. St. Louis 6, Mo.

FOR SALE

One New Jeffrey Shortwall 250 DC Coal Cutting Machine. This machine has never cut any coal, 42" Gauge with 8½' Cutter bar, Cincinnati Chain, Complete with 250' cable.

Price $5,500.00

WILKINS COAL COMPANY
MARION, ILLINOIS

HIGH GRADE TOOLS

16"x10' New C-J Geared Head Lathe
24"x10' L & S Q.C. Lathe
27"x20' L & S Q. C. Lathe
36"x32' American Grd Hd Lathe
#2 to #5 Plain Millers
2' to 6' Radial Drills
16" to 24" Shapers
150 Ton Caldwell Wheel Press

Also various other tools.

Cincinnati Machinery Company, Inc.
218 E. Second St. Cincinnati 2, Ohio

FOR SALE

Goodman Underground Conveyors, 250 volt
2—G15 With side drives
8—G12½
1—G20
1—Myers #3 Automat Coal Loading Machine 44" gauge, 250 volt.
2—6 ton tubular steel Monitors, 44" gauge with 1" ropes, 1300 feet long and spool type drum 10' x 12'.
2—512AA Goodman Mining Machines, 250 volt.
1—300 KW Westinghouse Rotary Converter.
1—6' Radial Drill.

GUYAN MACHINERY COMPANY
Logan, West Virginia

FOR SALE

1—4 Cu. Yd. Type "AX", Std. Red Arch Bucyrus-Erie Dragline Bucket complete with chains & sockets. Only used 45 days.

ATLAS COAL CO., Inc.
Oskaloosa, Iowa

1—Main shaker shaft 6 in. Diam., 16 ft. 9 in. long with 4-21 inch x 14 inch cast iron boxes babitted and 4-15 inch Diam. cams with 4 inch face, straps and arms to match —complete for your sizeing decks $10,000.00

1—Set compound crusher rolls 29"x24" chilled steel removable segments—drive gear 48"x6" face $1,800.00

Numerous other items of coal mine and preparation equipment.

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4/0 Grooved. Also 2/0 and 3/0

COPPER FEEDER WIRE

500,000 CM Bare and Insulated

New Fabricated Landing Mats for re-inforcing, fence, mine roadways for shuttle cars, etc.

Safety Spectacles, Full Vue.

Asbestos Mittens.

MANSBACH METAL COMPANY
Logan, W. Va. Phone 1071

FOR SALE

ELEC. LOCOMOTIVE

New G.E. electric locomotive, Type LME-2C4-C; 2 motor, rated weight 4 tons, maximum drawbar pull 2400 lb., 30 in. track gauge, wheelbase 44 in., length 145 in., width 42 in., height above rail 38 in.; coupling single slot pocket 10½" above rail; rated voltage 125 volts; 2 headlights, sanders at four wheels. Delivered 1946. Never operated—Save 35%. Address inquiries to:

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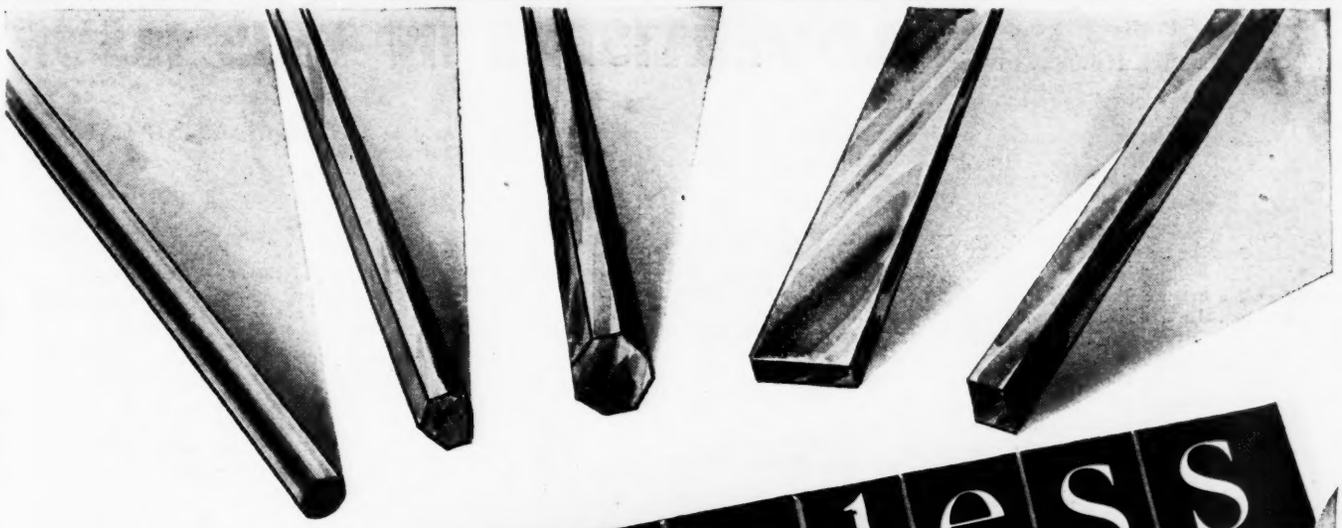

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ONLY 10c PER POUND

FOR TOP QUALITY BARS AND PLATES IN PRODUCTION-RUN QUANTITIES

Think of it! Here's the steel you need *now*—priced far below mill prices. Warehouses must be cleared quickly for other surplus. Hence this amazing bargain today.

At this price you can afford to stockpile even against next year's requirements—for these savings will pay storage and interest charges over a long, long time.

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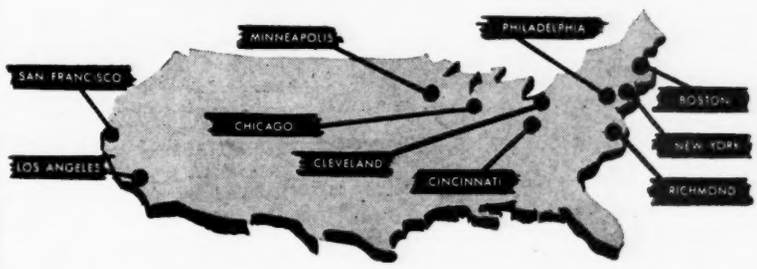

types available:

302, 303, 304, 347, 416, 420, 431, 440. Rounds, hexagons, octagons, flats, squares.

Also fair quantities of stainless steel tubing at about 50% discount from net mill prices f.o.b. location.

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The material offered is subject to withdrawal prior to shipment.

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■

■

SEARCHLIGHT SECTION
Classified Advertising

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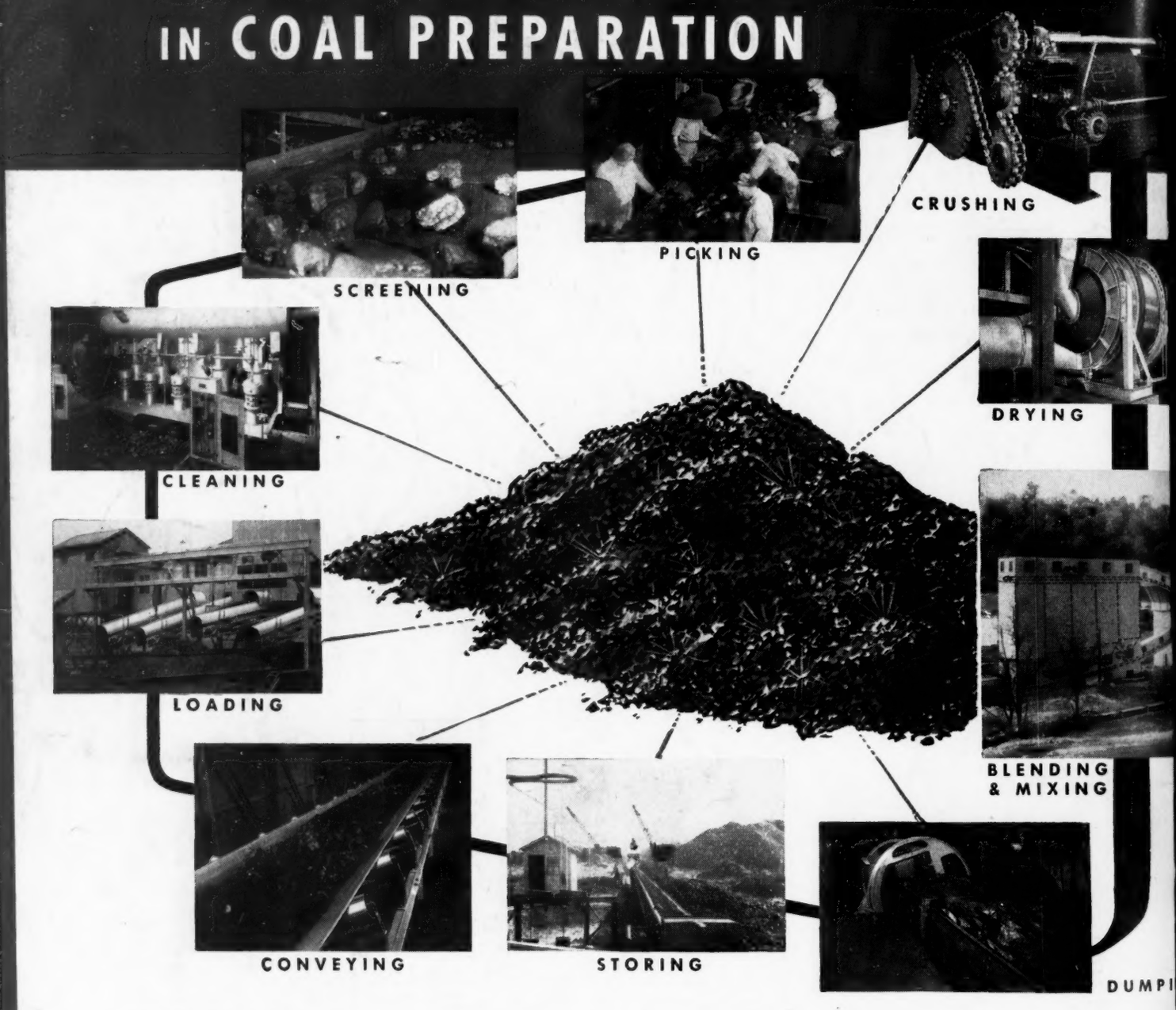
HAZARD WIRE ROPE DIVISION
AMERICAN CHAIN & CABLE

TRADE MARK

In Business for Your Safety

LINK-BELT OFFERS YOU MANY YEARS OF SPECIALIZED EXPERIENCE IN COAL PREPARATION



ALMOST from its inception, over 70 years ago, Link-Belt Company has devoted a large portion of its engineering and manufacturing business to the handling and preparation of coal.

The first successful coal washeries in the United States were built by Link-Belt in the early nineties, and since that time Link-Belt has developed and manufactured washing jigs and related equipment on an ever increasing scale.

Mechanization in handling and preparation is the only answer today to the low-cost production of quality coal.

Link-Belt designs, builds, installs and services. Link-Belt offers you broad experience, proved performance and centralized reliable responsibility. Discuss your mechanization plans wtih us.

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10,528

COAL PREPARATION AND HANDLING EQUIPMENT

Engineered, Built and Backed by LINK-BELT